State of California Department of Consumer Affairs

BOARD FOR PROFESSIONAL ENGINEERS AND LAND SURVEYORS

2535 Capitol Oaks Drive, Suite 300, Sacramento, CA 95833-2944
Telephone: (916) 263-2222 CALNET: 8-435-2222
Facsimile: (916) 263-2246
www.dca.ca.gov/pels

Larry Keresz

11:35 am

COMPLAINT FORM

1. SUBJECT (Engineer or Land Surveyor)

Smart Mobility, Inc.: Lucinda Gibson; Norman; Marshall; Nicholas Burke; Brian Grady; Jolyon Rivoir-Pruszinski
Name of individual and license/registration number, if known

16 Beaver Meadow Road #3, PO Box 750
Street Address

Norwich, VT 05055
City, State, Zip Code

802-649-5422 Daytime Telephone
802-649-5422 FAX Number

Pager Number
Cellular Phone Number

Home or evening telephone

www.smartmobility.com
E-mail address or website (if known)

2. COMPLAINANT (Person filing complaint)

David Lowe, P.E., Acting Chief Engineer
Your name

Foothills/Eastern Transportation Corridor Agency
Business name, if any

PO Box 53770
Street Address

Irvine, CA 92619-3770
City, State, Zip Code

949-754-3488 Daytime Telephone
949-754-3491 FAX Number

Evening Telephone
Cellular Phone Number

lowe@sjhtca.com
E-mail address

3. SUBJECT PROPERTY ADDRESS (if different from answer # 2) and/or description of property location. Include city and/or county.

The southern segment of State Route 241, from the existing terminus of SR 241 in southern Orange County to Interstate-5 at Christianitos Road in San Diego County.

PLEASE COMPLETE QUESTIONS 4 AND 5 AND DECLARATION ON NEXT SHEET

<<<<<<<<<<<<<Section for office use only — Please do not write below this line >>>>>>>>>>

Case No. ____________ Class Code ____________ Source Code ____________
Date Opened ____________ Violation § § ____________ Ack Card Sent:
License No./Exp. Date ____________ Date: ____________
Initials: ____________
Organization Record: Yes ☐ No ☐
Previous Cases: ____________

4. DESCRIBE YOUR COMPLAINT: Be specific. What happened? Who else is involved, including City o County agencies (names, addresses, phone numbers)? Give dates and details. Include copies of **ALI DOCUMENTS,** including plans, maps, letters, contracts, etc. If there is no written contract, explain the details o the agreement, including dates. Attach extra pages as required — be as complete as possible. See "How to File a Complaint" for more details.

Please see Attachment A.

5. WHAT DO YOU WANT THE BOARD TO ACCOMPLISH IN RESOLVING YOUR COMPLAINT?

Please see Attachment A.

6. DECLARATION

I declare, under penalty of perjury, that the information contained in this complaint, including any attached pages, is true and correct to the best of my knowledge and belief.

Signature [signature] Date 1/23/08

Please let us know how you obtained this form. This information will help us evaluate the effectiveness of the different methods we use to inform consumers of the services provided by the Board for Professional Engineers and Land Surveyors. Thank you.

Board for Professional Engineers and Land Surveyors.

INDEX OF ATTACHMENTS TO COMPLAINT

Attachment	Description
A	Description of Complaint
B	2007 SMI Report
C	2005 SMI Report
D	Curriculum vitae of Norman Marshall as submitted with the 2007 SMI Report
E	Curriculum vitae of Lucinda Gibson, PE, as submitted with the 2007 SMI Report
F	Search Results for Professional Engineers and Professional Land Surveyors with last name "Marshall"
G	Search Results for Professional Engineers and Professional Land Surveyors with last name "Gibson"
H	Website of Smart Mobility, Inc.
I	Corporation information of Smart Mobility, Inc. obtained from Vermont Secretary of State
J	Website of ORW, Inc.
K	Corporation information of California State Parks Foundation obtained from California Secretary of State
L	Correspondence with the California Coastal Commission regarding the SMI reports
M	2008 SMI Report
N	California Department of Transportation Review of 2007 SMI Report

A

ATTACHMENT A

Description of Complaint

I. INTRODUCTION

This is a complaint filed by the Foothill/Eastern Transportation Corridor Agency (the "Agency") against Smart Mobility, Inc. ("SMI") and officers and employees of SMI for violations of the Professional Engineers Act (Business and Professions Code §§ 6700 et. seq.). The Agency is a joint powers authority formed by the County of Orange and twelve cities in the County pursuant to California law to plan, finance and construct state highways in Orange County. The Agency is required to comply with the design standards of the California Department of Transportation ("Caltrans") in the design of the highways. Upon completion, the highways are conveyed to Caltrans. The highways are operated by the Agency as toll facilities until the construction bonds area retired. The Agency, and its sister agency, the San Joaquin Hills Transportation Corridor Agency, have completed fifty-one miles of the regional highway system. The state highways constructed by the Agency that are in operation are State Route ("SR") 73, SR 133 (between I-5 and SR 241), SR 261 and the northern segment of SR 241. 300,000 vehicles a day use the regional highway system constructed by the Agency.

After two decades of engineering studies and environmental analysis, in February 2006, the Agency approved the alignment and design for the last segment of the regional highway system – the southern segment of State Route 241 ("Project"). The Project is also known as the "Foothill Transportation Corridor – South" and as the "Southern Orange County Transportation Improvement Project". The Project extends from the existing terminus of SR 241 in southern Orange County to Interstate-5 at Christianitos Road in San Diego County. The design and alignment of the Project approved by the Agency reflects the recommendations of Caltrans, the Federal Highway Administration, the U.S. Environmental Protection Agency, the U.S. Army Corps of Engineers, and the U.S. Fish and Wildlife Service. The Project is a critical component of the regional transportation plans and the transportation improvement programs adopted by the

Southern California Association of Governments and the San Diego Association of Governments.

SMI is a Vermont company with no branch office in California. (Attachment I.) None of its officers and directors is licensed in the State of California. (Attachments H, I, F, G.) Specifically, its President and Vice President Norman Marshall and Lucinda Gibson are not licensed in California. (Attachments F, G.)

In 2005 and 2007, SMI and its principals/officers prepared two engineering reports for the California State Parks Foundation, a California corporation. (Attachments B, C, K.) Both reports were prepared regarding the Project. (Attachments B, C.)

Further, in 2007, SMI submitted the résumé of its director "Lucinda Gibson, P.E." along with its report on the Project. Ms. Gibson, however, is not licensed in California.

II. FACTUAL INFORMATION

A. 2005 Smart Mobility Report

In July 2005, SMI and its director/principal Norman Marshall prepared a report on the Project, entitled *A Practical, Cost Effective, and Environmentally Superior Alternative to the Foothills South Toll Road for the South Orange County Transportation Infrastructure Improvement Project* (hereinafter "2005 SMI Report"). (Attachment C.)

The 2005 SMI Report was prepared for the California State Parks Foundation, a California corporation. (Attachment K.) The 2005 SMI Report was submitted to the California Coastal Commission, which provided a copy to the Complainant. (*See* Attachment L.) The 2005 SMI Report consists of the studies of traffic performance and project costs, and the designs, plans, and specifications of the improvement of Interstate-5 ("I-5") in south Orange County, California. (Attachment C.)

SMI acknowledges it is the company in responsible charge of the 2005 SMI Report. SMI is the only company identified on the 2005 SMI report. In addition, it has even identified the report as the "July 2005 Smart Mobility Report." (Appendix A to Attachment B, Attachment C.)

B. 2007 Smart Mobility Report

In September 2007, SMI prepared another engineering report on the Project, entitled *An Alternative to the Proposed Foothill South Toll Road: The Refined AIP Alternative* (hereinafter "2007 SMI Report"). (Attachment B.) The 2007 SMI Report was submitted to the California Coastal Commission, which provided a copy to the Complainant. (*See* Attachment L.) The 2007 SMI report consists of the studies of traffic performance, project costs, property impacts, and related cost analysis; the specification of a runoff management plan; and the designs, plans, and specifications of the interchanges, arterial intersections, cross sections, further enhancements, and other improvement of I-5 in south Orange County, California. (Attachment B.)

The California Department of Transportation prepared an evaluation of the 2007 SMI Report and concluded that the 2007 report does not meet California design standards and "does not meet applicable engineering standards of care." (Attachment N.)

The 2007 SMI Report only identifies SMI as the company that "prepared" the 2007 report. (Attachment B.) In fact, only "Smart Mobility, Inc." is identified at the bottom of all 33 pages of the 2007 SMI Report. (*Ibid.*)

Although the 2007 SMI Report also mentions the "collaboration" of three other companies – a Vermont landscape architectural and planning firm (ORW Inc.), a Vermont company that performs computerized analysis (Oman Analytics), and a California firm that specializes in water-dependent ecosystems (Philip Williams & Associates, Ltd.) – it is apparent these three companies are not in responsible charge of the report. The two Vermont companies (ORW Inc. and Oman Analytics) have no branch office in California and have no owner or officer who is registered in California. (Attachment J; résumé of Michael F. Oman, Attachment B.) And while Philip Williams & Associates, Ltd. is a California firm with principals who are licensed in California, it is a California firm that specializes in "the protection, enhancement, and restoration of water-dependent ecosystems," and does not specify transportation planning on its website. Among the three members of Philip Williams & Associates, Ltd. who were involved in the 2007 SMI report, none has noted any experience in transportation planning. (Attachment K;

résumés of Bob Battalio, P.E., Mark Lindley, P.E., and Christian Nilsen, P.E., Attachment B.) In fact, Philip Williams & Associates, Ltd. is only identified in the "Conceptual Runoff Management Plan" that was submitted with the 2007 SMI report as an appendix. (Attachment B.)

Thus, it is clear that SMI has represented that it is the primary author and is in responsible charge of the preparation of the 2007 SMI report.

C. 2008 Smart Mobility Report

In January 2008, SMI prepared a revised engineering report on the Project, entitled *An Alternative to the Proposed Foothill South Toll Road: The Refined AIP Alternative Design Modifications to Reduce Displacements* (hereinafter "2008 SMI Report"). (Attachment M.) The 2008 SMI Report was submitted to the California Coastal Commission, which provided a copy to the Complainant. Similar to the 2007 SMI Report, the 2008 Report consists of the studies of traffic performance, project costs, property impacts, and related cost analysis; the specification of a runoff management plan; and the designs, plans, and specifications of the interchanges, arterial intersections, cross sections, further enhancements, and other improvement of I-5 in south Orange County, California. (Attachment M.)

Again, the 2008 SMI Report only identifies SMI as the company that "prepared" the 2008 report. (Attachment M.) As in the 2005 and 2007 reports, only "Smart Mobility, Inc." is identified at the bottom of all 35 pages of the 2008 SMI Report. (*Ibid.*) Similarly, it is clear that SMI has represented that it is the primary author and is in responsible charge of the preparation of the 2008 SMI report.

D. Lucinda Gibson, P.E.

SMI submitted with the 2007 SMI report several résumés, including that of its President Lucinda Gibson, with the title "P.E.," short for Professional Engineer. (Attachments C, E.) While Ms. Gibson holds a Vermont license to practice civil engineering, she does not have a California license to practice civil or traffic engineering in California. (Attachment G.)

E. Norman Marshall

Norman Marshall is noted as the person who "prepared" the 2005 SMI Report, a report prepared for the California State Parks Foundation on a California project. (Attachment C.)

SMI also submitted with the 2007 SMI report the résumé of Mr. Marshall. (Attachments B, D.) Among the projects listed on Mr. Marshall's résumé include one project in California – "*Foothill South Toll Road (Orange County, CA)* – Reviewed modeling of proposed toll road." (Attachment D.)

But Mr. Marshall does not have a California or Vermont license to practice civil or traffic engineering. (Attachment F.)

F. Smart Mobility, Inc.

SMI is a Vermont company with no branch office in California. (Attachments H, I.) According to the information available on the website of Vermont Secretary of State, its listed officers and directors are: President Lucinda Gibson, Vice President Norman L. Marshall, Secretary C. Nicholas Burke, and Treasurer Brian Grady. (Attachment I.) Four staff members are identified on the website of SMI – Norm Marshall, Lucinda Gibson, Brian Grady, and Transportation Analyst Jolyon Rivoir-Pruszinski. (Attachment H.) Among the five officers and staff members, only Lucinda Gibson is a licensed professional engineer. (*Ibid.*) Ms. Gibson is only licensed in Vermont, and not in California. (Attachments E, F, G; see *supra.*) In fact, none of SMI's officers and staff members is licensed in California.

Both 2005 SMI Report and the 2007 SMI Reports identify SMI, Inc. as the company that "prepared" the reports. (Attachments B, C.) In the 2005 SMI Report, the cover and all 10 pages of the report have only "Smart Mobility, Inc." identified. (Attachment C.) In the 2007 SMI Report, all 33 pages of the report have only "Smart Mobility, Inc." identified. (Attachment B.)

III. ANALYSIS

The discipline of professional engineers – including civil engineers and traffic engineers – is regulated by the provisions of the Professional Engineers Act, which is contained in the

Business and Professions Code section 6700 et seq. (All section references are to the Business and Professions Code unless otherwise specified.) The general licensing requirement is contained in section 6704, which provides as follows:

> In order to safeguard life, health, property, and public welfare, no person shall practice civil, electrical, or mechanical engineering unless appropriately registered or specifically exempted from registration under this chapter, and only persons registered under this chapter shall be entitled to take and use the titles "consulting engineer," "professional engineer," or "registered engineer," or any combination of those titles. ...

Section 6787(a) renders it a misdemeanor to act in the capacity of a professional engineer in California, including: (1) practice or offer to practice civil engineering in any of its branches, including traffic engineering; and (2) represent as or use the title of civil engineer or traffic engineer, or any abbreviation of such titles, unless the person is correspondingly qualified by registration as a civil engineer under the Professional Engineers Act.

The Professional Engineers Act is applicable to individuals as well as corporations, including out-of-state businesses. A person is considered "practicing civil engineering" when he/she "professes to be a civil engineer or is in responsible charge of civil engineering work." (Bus. & Prof. Code, § 6734.) An out-of-state business may practice civil engineering in California only if: (1) it has a branch office in California; and (2) has a part owner or officer who is in charge of the engineering work in the branch in California, who is registered in California, and is physically present in California. (Bus. & Prof. Code, § 6738(a)(3).)

Whether a person or corporation is engaging in the business or acting in the capacity of a civil engineer may be determined from the statutory definition of "civil engineering" contained in sections 6731, 6731.1, and 6734. The practice of civil engineering includes: "the following studies or activities in connection with fixed works for ... highways ... or bridges: The investigation of the laws, phenomena and forces of nature[;] The preparation or submission of designs, plans and specifications and engineering reports ...." (Bus. & Prof. Code, § 6731.)

In this case, SMI was the company in responsible charge of the 2005 SMI Report and the 2007 SMI report. Both reports were prepared in connection with the Project, a project in California. (Attachments B, C.) The reports were prepared for the California State Parks Foundation, a California corporation, and submitted to the California Coastal Commission. (Attachments B, C, K, L.)

SMI's preparation of the reports constitutes the practice of civil engineering and traffic engineering in California. The two engineering reports discussed several aspects of the California I-5 project alternative, including:

- the discussion of traffic performance;
- the discussion of displacement impacts and costs;
- the study, plan, design, specifications, and impact for the proposed configuration;
- the study of designs of interchanges;
- the study of designs of arterial intersections;
- the study of designs of cross sections;
- the discussion of further enhancements including an enhanced transit component for the arterials improvement plan, transit services in suburban communities, a fixed route, a deviated fixed route service, a demand responsive service, express bus, bus rapid transit, subscription bus, and other innovations in transit service;
- other infrastructure requirements and land use considerations for further enhancements;
- the study of property impacts and related cost analysis; and
- the discussion of a runoff management plan, with an appendix of a memorandum written by Philip Williams & Associates, Ltd., focusing on the environmental aspects of the I-5 alternatives.

Thus, SMI's preparation of the two engineering reports constitutes the "practice of civil engineering" under Business and Professions Code section 6731.

Under sections 6704 and 6787(a), no person shall practice civil engineering unless appropriately registered under the Professional Engineers Act. In addition, as an out-of-state business, SMI may not practice civil engineering in California unless it has a branch office in California and has a part owner or officer who is in charge of the engineering work in the branch in California, who is registered in California, and is physically present in California. (Bus. & Prof. Code, § 6738(a)(3).)

In this case, SMI is an out-of-state business that does not have a branch office in California, and does not have a part owner or officer who is in charge of the engineering work in the branch in California, who is registered in California, and is physically present in California. Yet, SMI prepared two engineering reports on a California project for a California corporation and submitted to the California Coastal Commission, an activity that constitutes "the practice of civil engineering" and "traffic engineering" in California. (Attachment L.)

Further, SMI even misrepresented that one of its officers who was in charge of the reports is licensed in California. In the 2007 SMI Report, SMI submitted the résumé of its director/officer Lucinda E. Gibson, using the title "P.E.," even though Ms. Gibson is not licensed in California. SMI was, in essence, holding out that one of its officers is licensed in California. is a licensed professional engineer through the use of the title "P.E.," without disclosing that Ms. Gibson is not licensed in California and is therefore not authorized to practice engineering in California.

SMI's practice of civil engineering without a licensed engineer, and its misrepresentation that one of its officers is licensed in California directly violate the Professional Engineers Act. In addition, by holding out to companies in California that she is a California licensed professional engineer and by practicing civil engineering in California without a valid license, Ms. Gibson is also in direct violation of the Professional Engineers Act. Section 6787(a) renders such act a misdemeanor.

IV. CONCLUSION

In sum, there is overwhelming evidence to support that SMI and its President, Lucinda Gibson, are practicing civil engineering and traffic engineering without legal authorization in violation of the Professional Engineers Act.

For all of the foregoing reasons we request that the Board for Professional Engineers and Land Surveyors conduct a full investigation, issue a citation to SMI and Ms. Gibson for violations of the Professional Engineers Act, order SMI and Ms. Gibson to cease and desist from further violations of the Professional Engineers Act, and other appropriate relief, including, but not limited to, advising California agencies that SMI and Ms. Gibson have violated the Professional Engineers Act and that California agencies may not rely on the SMI reports.

Dated: January 23, 2008

Respectfully submitted,

NOSSAMAN, GUTHNER, KNOX & ELLIOTT, LLP

By: John P. Wagner
JOHN P. WAGNER

Attorneys for Foothill/Eastern Transportation Corridor Agency

B

An Alternative to the Proposed Foothill South Toll Road

The Refined AIP Alternative

Prepared by:

Smart Mobility, Inc.

In Collaboration with:

Philip Williams & Associates, Ltd.
ORW Inc.
Oman Analytics

September 2007

smart mobility

PWA
ENVIRONMENTAL HYDROLOGY

TABLE OF CONTENTS

List of Figures

List of Tables

Attachments

Project Area Maps
Selected Cross Sections
Selected Interchange Area Plans

Appendices

A Practical, Cost Effective, and Environmentally Superior Alternative to the Foothills South Toll Road for the South Orange County Transportation Infrastructure Improvement Project. Prepared by Smart Mobility, Inc., for the California State Parks Foundation, June 2005.

Memorandum, *Conceptual Runoff Management Plan for the I-5 AIP-R Alternative*, Prepared by Philip Williams, Inc. September 5, 2007.

OVERVIEW

For years, the Foothill/Eastern Transportation Corridor Agency ("TCA") has claimed that sacrificing wildlife habitat and a popular state park for a new toll road is the only way to get traffic relief in south Orange County. However, this study conclusively shows that TCA is wrong. Feasible, sensible alternative approaches are available that can provide the same traffic relief without destroying either huge expanses of habitat or large numbers of homes and businesses.

The sole basis for TCA's claim was that environmentally superior alternatives involving improving existing roads – for example, expanding the Interstate 5 and improving parallel surface streets – would require the destruction of over 1,200 existing residences and businesses. Consequently, TCA claims that a highway through the heart of open space preserves, a four-mile section of San Onofre Beach State Park, and a rare mosaic of coastal habitat types is actually the most environmentally sensitive feasible alternative. Yet TCA has never supported these conclusions with any analysis.

This report, prepared by a team of nationally recognized experts in the fields of transportation planning, traffic engineering, transit planning, hydrological engineering, and economic planning, explains why parks and sensitive coastal habitat need not be destroyed to get the traffic relief the toll road is advertised to bring. The TCA's own analysis shows that adding a carpool lane on either side of the I-5–from just south of the El Toro interchange to the County line–and making certain improvements to surface streets would give south Orange County drivers all of the traffic benefits of the toll road. Moreover, using state-of-the-art, context-sensitive highway and interchange designs in the construction of this alternative would reduce its cost by $1 billion – and reduce the displacement of existing homes and businesses by 97% (from 1,237 to less than 50) – in comparison to TCA's estimates.

What does this mean for the toll road project? It means that environmentally superior alternatives that the TCA summarily rejected as infeasible and cost prohibitive are actually feasible and cost competitive. It means that a State Park and other ecologically sensitive habitat need not be destroyed to achieve the project's claimed traffic benefits. It means that the most critical argument supporting the toll road – that there is no other way – is fundamentally flawed.

How do we know that the carpool lane/surface street alternative will produce the same or better traffic benefits as the toll road? Put simply, TCA says it will. In their 2003 study modeling the toll road's effect on regional traffic, TCA's own traffic consultants concluded that an alternative functionally identical to the alternative described in this report (the AIP alternative) performed as well or better than any of the toll road alternatives (including the one TCA selected) in reducing congestion on the I-5, in reducing regional congestion, and in reducing overall vehicle hours traveled.

How do we know that the carpool lane/surface street alternative is environmentally superior? Once again, TCA's analysis says so. Aside from the obvious fact that the alternative studied by Smart Mobility almost completely avoids sensitive biological resources and totally avoids San Onofre Beach State Park, the TCA in its own environmental analysis conceded that the AIP alternative was environmentally superior.

How did the TCA come up with such an excessive number of business and residential displacements (1,200) where this report suggests only about 50? An exhaustive review of available background studies did not reveal any analysis supporting the TCA's conclusion that the AIP alternative would cause extensive, unavoidable displacement of homes and businesses. It seems apparent, however, that the design options selected by TCA were chosen without any effort to avoid impacts on the existing built environment. As a result, large stormwater detention basins (for water pollution control) and extensive "cloverleaf" interchanges were selected without regard to these designs' impact on nearby structures. Predictably, these extravagant designs resulted in an overblown estimate of impacts to nearby properties.

By contrast, the "context sensitive" approach used in this report– an approach endorsed by CalTrans and federal highway authorities – requires exploration of more refined design options that take into account the limitations and challenges posed by existing development. We have developed feasible design options that are consistent with these constraints and with sound engineering principles. Additionally, we made extra efforts to locate detention basins and other water quality facilities where they would function hydrologically without affecting existing development. Similarly, we have proposed interchange designs that will provide the needed capacity, but minimize the use of land. Similar approaches are used all over the country by highway designers faced with the challenge of increasing highway capacity in already urbanized areas.

How do we know that the refined AIP alternative, described in this report, will work? As stated above, the traffic performance of the carpool lane/surface street improvement alternative we propose has been validated by TCA's own consultants. With the exception of interchange design, it is functionally identical to the "AIP Alternative" analyzed in detail by Austin Faust and Associates in 2003. As for the interchanges, one of the considerations for the designs chosen was to accommodate the TCA's own estimates of projected volumes on each interchange assuming an expanded I-5. Further design refinements (e.g. signalization adjustments) will be included in later stages of design as needed.

What independent work has CalTrans done on the feasibility of Smart Mobility's proposed alternative? CalTrans has confirmed in writing that it has performed no independent analysis of the feasibility of avoiding displacements from adding an HOV lane to either side of the I-5 and associated interchange improvements as proposed by Smart Mobility or by the TCA in the AIP alternative. It is worth noting, however, that interchange improvements along the I-5 and the addition of a carpool lane in either direction on the I-5 between SR 1 and Avenida Pico are already programmed in the County's 2006 Long Range Transportation Plan, and no unacceptable displacements are noted.

Is the AIP alternative the final answer to South Orange County's traffic problems? There is no one single answer to accommodating traffic growth in South Orange County. What can be said is that this alternative is equally or more effective than the toll road in resolving traffic congestion, without the huge and permanent loss of irreplaceable environmental and recreational resources that the toll road would cause. Tolerating such losses should arguably not be even a last resort, much less an expedient one, as TCA proposes. Less damaging feasible alternatives, such as the Refined AIP alternative, should be adopted first.

EXECUTIVE SUMMARY

As part of the Supplemental Environmental Impact Report ("SEIR") for the Foothill-South Toll road extension, a number of project alternatives were evaluated in detail, including the Arterial Improvements Plus ("AIP") alternative. The AIP alternative consists of the following improvements:

- Targeted widening of I-5 to add one additional HOV lane in each direction south of the El Toro interchange and auxiliary lanes in appropriate locations.
- Improvements to existing arterials, including expansion of Antonio Parkway/Avenida La Pata into a "smart street" of 6-8 lanes between Avenida Pico and Oso Parkway.

The SEIR concluded that the AIP alternative performed equally or better than the proposed toll road route through the state park at San Onofre for relieving traffic congestion in southern Orange County.

The Toll Road Agencies, however, rejected the AIP alternative from further consideration in the SEIR because of projected costs for property acquisition and socioeconomic impacts to communities along the I-5 corridor. The SEIR stated that the AIP alternative would require the acquisition of 898 housing units and 339 businesses, and would displace 2,208 persons and 4,000 jobs. These projected displacements, however, were not supported by any description of methodology or assumptions in the SEIR or supporting documents.

The purpose of this report is to explore whether the engineering design details of the AIP alternative could be refined in order to minimize displacement of existing housing units and businesses and associated right-of-way acquisition costs.

A Refined Design Would Protect Homes and Businesses

Our refined design for the AIP alternative, described in this report as the "AIP-R", follows conventional engineering practice, including design guidelines established by the Federal Highway Administration (FHWA), the American Association of State Highway and Transportation Officials (AASHTO) and the California Department of Transportation (CalTrans) for transportation projects in urbanized areas.

The refined AIP ("AIP-R") alternative provides the superior traffic benefits of the original AIP alternative, while avoiding the nearly all of property takings identified in the SEIR.

The AIP-R alternative includes the following key design elements:

- Targeted widening of I-5 to add one additional HOV lane in each direction south of the El Toro interchange and auxiliary lanes in appropriate locations.
- Improvements to existing arterials, including expansion of Antonio Parkway/Avenida La Pata into a "smart street" of 6-8 lanes between Avenida Pico and Oso Parkway.
- Appropriately designed interchange improvements to alleviate congestion, consistent with current best practices in transportation design for urban locations.
- A refined Runoff Management Plan to address surface water.

Nearly all of the widening of I-5 can be completed within the existing I-5 right of way. Most of the displacements noted in the SEIR for the AIP alternative resulted from interchange improvements and extended detention basins. Therefore, our refined design was particularly focused on developing designs for these improvements that minimize impacts to property.

The design described in this report avoids the vast majority (over 95%) of the commercial and residential displacements identified in the SEIR without sacrificing traffic congestion relief. The following table summarizes the results.

Table ES1: Potential Displacements for the AIP-R Alternative by Community

	Commercial		Residential	
	Acquisition Cost	Displacements	Acquisition Cost	Displacements
Lake Forest	$ 1,200,000	1		
Laguna Hills	$ 11,730,000	3		
Mission Viejo	$ 3,231,000	2		
San Clemente	$ 4,481,000	10	$ 2,154,000	11
San Juan Capistrano	$ 3,243,000	4		
Total	$ 24,485,000	20	$ 2,154,000	11
Grand Total Cost	$ 26,639,000			

The following table compares to the costs of the AIP alternative as reported in the SEIR (AIP-SEIR) with the refined AIP alternative (AIP-R). In order to compare the projected displacements of the AIP-R with the AIP-SEIR, only properties in which building structures would have to be removed are considered displacements. However, acquisition of additional small portions of properties may be required, which would not displace any buildings

Table ES2: Comparison of Displacements in AIP-R with AIP-SEIR

Type of Property	AIP- SEIR Properties	AIP-R Properties	AIP-SEIR Acquisition Cost	AIP-R Acquisition Cost	AIP-R as percent of AIP- SEIR Cost
Residential	898	11	$ 583,700,000	$ 2,150,000	0.4%
Commercial	339	20	$ 466,125,000	$ 24,480,000	5.3%
Total	1,237	31	$ 1,049,825,000	$ 26,630,000	2.5%

The AIP-R alternative is projected to result in the displacement of 11 residential properties and 20 commercial properties, with an acquisition cost of approximately $26.6 million -- only 2.5%, and approximately $1 billion less than, the AIP acquisition cost estimate provided in the SEIR.

Traffic Benefits From AIP-R Are Superior to Proposed Route through Park

The AIP alternative resulted in only 2.2% of daily traffic on I-5 experiencing congested conditions, whereas the proposed toll road alternative (A7C-FEC-M) has 3.2%. In terms of reducing congestion on arterial streets, the AIP alternative performs slightly better than the toll road (reducing delay on arterials by 24% rather than 23%). Further, the AIP reduces the vehicle-miles-traveled on the entire highway system for south Orange County from the "No Action" alternative, where the toll road alternative results in an increase in VMT. VMT is proportional to fuel consumption and air pollutant emissions, making the AIP superior for a variety of environmental and energy consumption measures as well.

With the design changes described in this report, which are based on best practices in transportation engineering and design, the AIP-R alterative addresses the Purpose and Need of SOCTIIP as defined in the SEIR better than the proposed toll road alternative, because it provides new roadway capacity and improvements where they are most needed: along the I-5 corridor. These improvements would require only minimal displacement of existing buildings, far less than described in the SEIR. The AIP-R alternative is a reasonable and feasible alternative to the toll road.

Conclusions

- The AIP-R is a reasonable, practicable, prudent and feasible alternative to the Foothill South Toll Road proposed by the TCA.
- The AIP-Refined (AIP-R) alternative results in extremely limited displacement when carefully designed to avoid private property, consistent with best practices for designing and engineering transportation infrastructure in urbanized areas. This negates the primary reason for the rejection of the AIP alternative in the SEIR, which was the purportedly severe impacts to private property.
- Based on SEIR data, the AIP-R alternative outperforms the toll road in relieving I-5 congestion and performs virtually as well as the TCA tollroad extension of Route 241 in terms of regional travel time savings and other typical traffic performance measures.
- The design described in this report avoids virtually all (over 95%) of the displacements identified in the SEIR without sacrificing performance

INTRODUCTION

The Foothill/Eastern Transportation Corridor Agency (TCA) presents voluminous traffic modeling and analysis attempting to show that a new toll corridor is necessary to accommodate future traffic needs in South Orange County.[1] However, a close look at the numbers and analysis presented show that a refined series of arterial and I-5 improvements could practically and cost-effectively meet future traffic demand without construction of a new toll road corridor through open space and state parkland.

TCA rejected an alternative (the Arterial Improvements Plus or "AIP" alternative) from full consideration in the SEIR because of purported high displacement impacts and associated costs. The SEIR stated that the AIP alternative (AIP-SEIR) would require the acquisition of 898 housing units and 339 businesses, and would displace 2,208 persons and 4,000 jobs[2]. These purported displacements and costs were not supported by any description of methodology or assumptions, either in the SEIR or in its underlying technical reports. Without this information, there is no basis for determining the validity of TCA's displacement analysis.

The documents that are in the public record indicate that TCA failed to engage in any effort to refine the design of the AIP alternative to avoid displacement. Displacement impacts for roadway projects can often be reduced or eliminated through design refinements, such as re-striping, widening on one side where no displacement would result and moving the centerline, and selecting designs for interchanges and other improvements that avoid or minimize displacement based on site-specific considerations. These design techniques are standard practice and are commonly used in the design process for highway improvements in urbanized areas.

As described in detail in this report, the design of the AIP-SEIR alternative can be refined to provide the same superior traffic benefits associated with that alternative with minimal displacement impacts and costs. This refined AIP alternative (AIP-R) represents a balanced approach, combining the addition of one HOV lane on high-demand segments of I-5 with a set of arterial improvements similar to those tested in the AIO (Arterial Improvements Only) alternative of the SEIR. The arterial improvements include expanding of Antonio Parkway/Avenida La Pata to an eight-lane smart street from Oso Parkway to San Juan Creek Road and to a six-lane smart street from San Juan Creek Road to Avenida Pico. This report provides a detailed description and line drawings for AIP-R alternative, demonstrating that the actual impacts to private property and required takings would be far less than reported in the SEIR.

---

[1] *Draft Environmental Impact Statement/Subsequent Environmental Impact Report and Draft Section 4(f) Evaluation for the South Orange County Infrastructure Improvement Project* (DEIS/SEIR), November, 2005; and the associated *Traffic and Circulation Technical Report* (TCTR), December, 2003.

[2] DEIS/SEIR, ES-16

The AIP Alternative Analysis in the SEIR

The SEIR analyzed and modeled an I-5 alternative that included adding 1 general purpose lane and 1 HOV lane in each direction throughout most of the study corridor. This was the only alternative focused on improving the existing I-5 corridor that was fully analyzed in the SEIR. An alternative that would have required significantly less widening of the I-5, combined with a program of arterial improvements, was rejected from further consideration.

The combined alternative, known as the Arterial Improvements Plus HOV and Spot Mixed-Flow Lanes on I-5 or "AIP" alternative, utilized limited capacity expansion on I-5, which included a new single-lane HOV lane in each direction, "the addition of spot mixed-flow auxiliary lanes south of Ortega Highway and south of Avenida Pico, and the reconstruction of several existing I-5 interchanges." (TCTR, p. 2-23). It also included the same arterial improvements described in the Arterial Improvements Only ("AIO") alternative described in the SEIR. Specifically, they include:

> *... the expansion of Antonio Parkway/Avenida La Pata to an eight lane smart street from Oso Parkway to San Juan Creek Road and to a six-lane smart street from San Juan Creek Road to Avenida Pico. In addition, Smart street technologies would also be included on Ortega Highway between Antonio Parkway/Avenida La Pata and I-5, Camino Las Ramblas between Avenida La Pata and I-5, and Avenida Pico between Avenida La Pata and I-5. Smart street technologies include a combination of advanced traffic management strategies such as traffic signal coordination, real time monitoring and surveillance, and traveler information, as well as modest physical improvements such as additional turn lanes at intersections. The effectiveness of providing grade separation at the intersections of Antonio Parkway/Oso Parkway, Antonio Parkway/Crown Valley Parkway, Antonio Parkway-La Pata Avenue/Ortega Highway, and Avenida La Pata/Avenida Pico will also be considered in the evaluation of the AIO Alternative. (TCTR, p. 2-19, 2-23)*

The AIP alternative was rejected from full consideration in the SEIR for the reasons given in the paragraph below.

> *Arterial Improvements Plus HOV and Spot Mixed-Flow Lanes on I-5 (AIP) Alternative. The AIP Alternative performed poorly in project costs and in cost per hour of travel time saved; well for traffic operating in congestion on I-5; moderately for hours of travel times savings; well in impacts to riparian ecosystems, CSS and gnatcatchers; and it displaces 898 residences. Based on the very poor performance of this Alternative related to project costs and socioeconomics, the Collaborative agreed to eliminate the AIP Alternative from consideration in the EIS/SEIR. (DEIS/SEIR, p. ES 16)*

As the above paragraph indicates, the rejection of this alternative was based entirely on "costs and socioeconomics." The SEIR concedes that the combined scenario performs "well" for I-5 congestion, impacts to riparian ecosystems, CSS and gnatcatchers. It is also listed as "moderate" for "hours of travel time savings" but it actually performs excellently, as explained below.

Traffic Performance

Based on the SEIR's own data, the traffic performance of the AIP-SEIR alternative compares favorably with *any* of the toll road corridor alternatives proposed by TCA, whether the performance metric is reducing future *Interstate 5* congestion, reducing vehicle delay on the arterial system, or reducing total vehicle hours of travel. An earlier report prepared by Smart Mobility[3] describes the relative traffic performance of the AIP alternative with the tollroad alternatives and is reproduced in Appendix 1. The conclusions of that report with respect to the key traffic performance metrics evaluated in the SEIR are summarized below.

Metric 1: Reduction of Future I-5 Congestion

The Traffic Technical Report summarizes projected 2025 congestion on I-5 in terms of *Percent of Daily I-5 VMT [vehicle miles traveled] in the Study Area Under Congested Conditions.* For the No Action alternative, the statistic is 16.9%. The values for the 11 new toll road alternatives range from 2.4% - 15.2%. *The AIP alternative outperforms all the new toll road alternatives, with only 2.2% of daily I-5 VMT operating under congested conditions in 2025.*

Metric 2: Vehicle Delay on Arterials

The Traffic Report summarizes year 2025 arterial roadway congestion in terms of *Vehicle Delay on the Arterial System.* For the No Action alternative, the number is 9,944 hours of delay during the morning and afternoon peak traffic periods. The values for the 11 new toll road alternatives range from 7,677 to 8,708. *Again the AIP alternative outperforms all toll road alternatives, with a value of 7,589.*

Metric 3: Total Vehicle Hours Traveled

Finally, the Traffic Report analyzes total vehicle hours of travel (VHT) for the modeled area of impact. Compared to the No Action alternative, the 11 toll road alternatives reduce VHT by 0.01% to 0.16%. The AIP alternative is shown as reducing VHT by a comparable 0.08%. Thus, under TCA's own approach to traffic modeling, the AIP alternative under-performs the best performing toll road alternative by only a *small fraction of one percent.* Even the best performing alternative shows insignificant changes to VHT, and the difference in VHT between that alternative and the AIP is even less significant.

Indeed, had TCA used standard modeling procedures for VHT, the AIP alternative would almost certainly have been shown to have greater VHT reductions than the toll road alternatives. TCA declined to employ universally accepted modeling procedures that take into account the effects of congestion on trip distribution by using "feedback loops" to provide a far more accurate projection of traffic impacts – despite TCA's acknowledgement that such modeling would reduce the traffic benefits of the toll road alternatives relative to the other alternatives. TCA's stated rationale for this decision was that the more accurate modeling would likely have shown a relative improvement in the performance of the AIP of *up to one percent* – a difference it described as "relatively minor." (Traffic and Circulation Technical Report "TCTR", p. 1-10). But even a one percent difference *is over ten* times the difference between the best performing alternative and the AIP using TCA's own calculations. More accurate modeling using standard feedback loop procedures would likely show that a combined alternative would outperform the toll toad alternatives in VHT reduction.

---

3 *A Practical, Cost Effective, and Environmentally Superior Alternative to the Foothills South Toll Road for the South Orange County Transportation Infrastructure Improvement Project*, Prepared by Norman L. Marshall, Smart Mobility, Inc. for the California State Parks Foundation, July 2005.

In sum, the data provided by TCA indicates that a balanced set of arterial and HOV lane improvements on the I-5 would provide traffic benefits that overall are superior to those of the toll road.

Displacement Impacts and Costs

The SEIR rejected the AIP alternative as infeasible based on "project costs" and because it purportedly "displaces 898 residences." (DEIS/SEIR, ES-16) The costs are in large part due to the purported displacements, so the estimate of displaced residences is critical to the feasibility determination. The SEIR failed to document, however, how the displacements were estimated. A technical report entitled Draft Relocation Impacts Technical Report: Final (December 2003) stated that the properties were counted if they fell within "limits of disturbance." No information was given as to how the area of disturbance was calculated along existing roadways. Since the AIP alternative would generally require a one-lane widening on each side of I-5, the estimated displacements appear on their face to be unrealistically high.

More importantly, TCA has not produced any evidence that it sought to avoid or minimize displacement impacts in the design of the improvements. As demonstrated in this report, even minor refinements to the design of the AIP can greatly reduce or even eliminate displacement, such as widening on one side and moving the centerline, narrowing frontage roads with low traffic demand to allow mainline freeway widening, context-sensitive interchange design, and design and siting of stormwater facilities to avoid developed property. Such a refinement process is critical when working within the constraints of an urban environment.

The remainder of this report describes a set of mainline, interchange and arterial improvements that are functionally identical to the AIP alternative but which include basic design refinements that maintain the AIP traffic performance while avoiding virtually all of the displacements identified in the SEIR.

DEVELOPMENT OF THE AIP-R ALTERNATIVE

The AIP-R alternative is based on a number of relevant documents and design guidelines. The basis for this alternative, the AIP-SEIR Alternative, was first set forth in the SOCTIIP DEIS/SEIR, and was described in more detail in the *Traffic and Circulation Technical Report*[4]. Since the preparation of the SEIR, the Orange County Long Range Transportation Plan[5] now includes many of the components of the AIP alternative, including the completion of La Pata to Antonio Parkway, and the improvements along the I-5 corridor.

The following sections describe some of the documents that were used to develop the design of the AIP-R alternative. The design of the AIP-R alternative is consistent with state, local and other relevant technical guidance.

AIP Alternative from SOCTIIP DEIS/SEIR

The AIP-R alternative includes functionally the same improvements as described for the AIP-SEIR, but some of the specific design features are modified to reduce the impacts to private property. The following excerpt from the SEIR describes the AIP Alternative.

---

[4] *SOCTIIP Traffic and Circulation Technical Report (TCTR), Prepared by Austin Foust Inc., December 2003.*

[5] *New Directions-Charting the Course for Orange County's Future Transportation System*, Orange County Transportation Authority, 2006 Long Range Transportation Plan, July 24, 2006.

2.1.5.2 Arterial Improvements Plus HOV and Mixed-Flow Lanes on I-5 Alternative The AIP Alternative, illustrated in Figure 2-15, assumes the same MPAH arterial enhancements described previously for the AIO Alternative as well as improvements along I-5 beyond the RTP. The I-5 improvements include the addition of one HOV lane in each direction from El Toro Road to south of Cristianos Road, the addition of spot mixed-flow auxiliary lanes south of Ortega Highway and south of Avenida Pico, and the reconstruction of several existing I-5 interchanges. The number of travel lanes in each direction on I-5 in the AIP Alternative is summarized in Table 2-1. The summary table also lists the existing lanes on I-5 and improvements that are under construction (i.e., committed) or are currently included in the RTP or in the *I-5 Route Concept Report* (CalTrans, April 2000) which is considered a subset of the RTP.[6]

The description above is supplemented by a table showing the additional lanes for each segment of I-5, which is reproduced in Table 1 later in this report. The "RTP" referred to in this description is the 2004 Orange County LRTP. Figure 1 below reproduces Figure 2-15 from the Traffic and Circulation Appendix of the SEIR, which illustrates the AIP Alternative.

Orange County Long Range Plan

The following language from the 2006 *Orange County Long Range Transportation Plan*[7] describes improvements that are proposed for the I-5 corridor, many of which were also included in the AIP alternative, but were not specifically mentioned in the 2004 LRTP at the time of the SEIR's publication.

San Diego Freeway (I-5) Improvements South of the El Toro "Y"
Add new lanes to I-5 from the vicinity of the El Toro Interchange in Lake Forest to the vicinity of SR-73 in Mission Viejo. Also add new lanes on I-5 between Coast Highway and Avenida Pico interchanges to reduce freeway congestion in San Clemente. The project will also make major improvements at local interchanges. The project will generally be constructed within the existing right-of-way. Specific improvements will be subject to approved plans developed in cooperation with local jurisdictions and affected communities.

The project will increase freeway capacity and reduce congestion. Current traffic volume on I-5 near the El Toro "Y" is about 342,000 vehicles per day. This volume will increase in the future by 35 percent, bringing it up to 460,000 vehicles per day. Regional plans also include construction of a new freeway access point between Crown Valley Parkway and Avery Parkway as well as new off ramps at Stonehill Drive using federal and state funds.

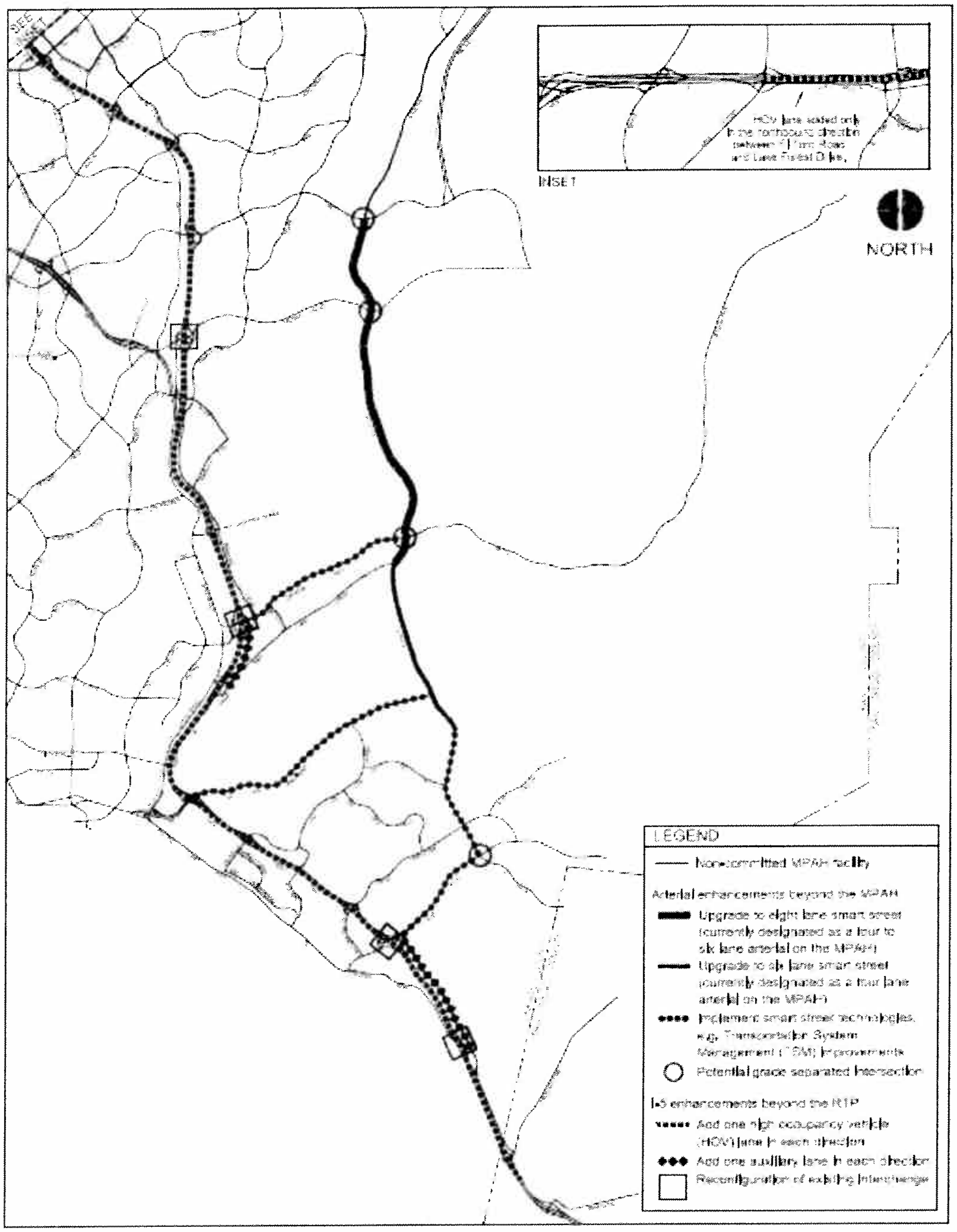
Santa Ana Freeway/San Diego Freeway (I-5) Local Interchange Upgrades
Update and improve key I-5 interchanges such as Avenida Pico, Ortega Highway, Avery Parkway, La Paz Road, El Toro Road, and others to relieve street congestion around older interchanges and on ramps. Specific improvements will be subject to approved plans developed in cooperation with local jurisdictions and affected communities.

---

[6] TCTR, page 2-23.

[7] *New Directions-Charting the Course for Orange County's Future Transportation System*, Orange County Transportation Authority, 2006 Long Range Transportation Plan (LRTP), July 24, 2006.

Figure 1: AIP Alternative from the SEIR



Arterial Improvements Plus HOV and Mixed-Flow Lanes on I-5 Alternative

SOCTIIP EIS/SEIR *Traffic and Circulation Technical Report* | **Figure 2-15**

I76010TrafficReportFig2-15.dwg *Page 2-24*
December 1, 2003

In addition to the project described above, regional plans also include improvements to the local interchanges at Camino Capistrano, Oso Parkway, Alicia Parkway and Barranca Parkway using federal and state funds. [8]

At the time that the SEIR was prepared, many of these improvements were not included in Orange County's LRTP, which contributed to the SEIR's conclusion that these improvements had no funding source. This listing of these improvements in the LRTP provides a much clearer path for funding of these improvements than is suggested in the SEIR.

Further guidance for the design of the AIP-R alternative is provided in the OCTA LRTP Volume 1 document, on page 4.11-8 to 4.11-9, which describes possible socioeconomic effects from highway improvements and proposed mitigation approaches:

Mitigation Measures
4.11-B For projects with the potential to displace homes and/or businesses, project implementation agencies shall evaluate alternate route alignments and transportation facilities that minimize the displacement of homes and businesses. An iterative design and impact analysis would help in cases where impacts to homes or businesses are involved. Potential impacts shall be minimized to the extent feasible. Existing rights-of-way should be used to the furthest extent possible.
4.11-C Project implementation agencies shall identify businesses and residences to be displaced. As required by law, relocation assistance shall be provided to displaced residents and businesses in accordance with the federal Uniform Relocation and Real Property Acquisition Policies Act of 1970 and the State of California Relocation Assistance Act, as well as any applicable City, County, and port policies.
4.11-D Project implementation agencies shall develop a construction schedule that minimizes potential neighborhood deterioration from protracted waiting periods between right-of-way acquisition and construction.
Level of Significance after Mitigation
By providing relocation as required under State and federal law, Mitigation Measures 4.11-B through 4.11-D will reduce displacement impacts to less than significant levels.[9]

In the design refinement process that led to the AIP-R Alternative, we followed the approach to mitigation as described in the 2006 Orange County LRTP for mitigation of displacements.

AASHTO Green Book

Design guidance provided by the AASHTO Green Book[10] is primarily applicable to the construction of new highways. This book sets forth guidelines for new construction, and also allows the designer some flexibility in applying the guidelines. The companion document Flexibility in Highway Design[11] provides further guidance in balancing highway design principles with community resources. The major design components of the AIP alternative, such as lane width, conform to the AASHTO standards. However, AASHTO guidelines do not generally apply for projects such as the AIP, which are primarily focused on the rehabilitation of a facility.

---

[8] LRTP, page 52.

[9] *New Directions-Charting the Course for Orange County's Future Transportation System*, Orange County Transportation Authority, 2006 Long Range Transportation Plan, Volume 1, page 4.11-8 to 4.11-9, July 24, 2006

[10] *A Policy on the Geometric Design of Highways*, American Association of State Highway and Transportation Officials, 2004.

[11] *AASHTO Guide for Achieving Flexibility in Highway Design*, American Association of State Highway and Transportation Officials, 2004.

CalTrans Highway Design Guidelines

The conceptual design plans presented in this report are consistent with all applicable CalTrans guidelines, such as lane width, median width, HOV buffer width, and other basic geometric features.

The FHWA and many Departments of Transportation now have adopted policies and practices that encourage "context sensitive solutions" for highway design, defined as, "solutions [that] use innovative and inclusive approaches that integrate and balance community, aesthetic, historic, and environmental values with transportation safety, maintenance, and performance goals. Context sensitive solutions are reached through a collaborative, interdisciplinary approach involving all stakeholders."

CalTrans provides the following design guidance on their website:

> Highway Design Manual Philosophy:
> The Highway Design Manual philosophy mirrors the concepts of Context Sensitive Solutions. This philosophy for the project development process seeks to provide a degree of mobility to users of the transportation system that is in balance with other values. CalTrans policies, practices, or mandatory design standards provides a guide for highway designers to exercise sound judgment in applying the policies, practices, or standards consistent with this philosophy. This flexibility is the foundation of highway design and highway designers must strive to provide for the needs of all highway users in balance with the needs of the local community and the context of the project. CalTrans policies, practices or mandatory design standards allow sufficient flexibility in order to encourage independent designs that fit the needs of each situation.
>
> Application of Standards: The policies, practices or mandatory design standards used for any project should meet the minimum guidance given to the maximum extent feasible, but the philosophy provides for the use of nonstandard design when such use best satisfies the concerns of a given situation. Deviations from the CalTrans policies, practices or mandatory design standards requires review and approval for nonstandard design through the exception process (see Index 82.2 of the Highway Design Manual) and should be discussed early in the planning and design process.[12]

CalTrans encourages the consideration of alternatives for interchanges, including the single point interchanges (SPI):

> Any SPI proposal must be compared to other conventional interchange types. Consistent with the philosophy of the PDPM, several interchange alternatives should be evaluated. The SPI alternative should be compared in particular to spread diamonds, L-9 partial cloverleaves (parclo) and tight diamonds. The type of interchange selected should be based on the discussions in these guidelines in order to select the best overall interchange configuration. [13]

CalTrans recognizes the potential of single point interchanges to provide higher capacity than tight urban diamond interchanges, and have a much smaller footprint than a partial cloverleaf. Design issues that need to be addressed for a single point interchange in later stages of engineering include coordination with the adjacent signalized intersection, and providing for the safe movements of bicyclists and pedestrians through the interchange.

The CalTrans Context Sensitive Solution website offers policy documentation and guidance in applying "innovative and inclusive" design approaches to projects:

> The Highway Design Manual philosophy mirrors the concepts of Context Sensitive Solutions. This philosophy for the project development process seeks to provide a degree of mobility to users of the transportation system that is in balance

---

[12] California Highway Design Manual, http://www.dot.ca.gov/hq/oppd/context/index.htm accessed on 4/13/07.

[13] *Single Point Interchange Planning, Design and Operations Guidelines*, CalTrans Memorandum, June 15, 2001.

with other values. Caltrans policies, practices, or mandatory design standards provides a guide for highway designers to exercise sound judgment in applying the policies, practices, or standards consistent with this philosophy. This flexibility is the foundation of highway design and highway designers must strive to provide for the needs of all highway users in balance with the needs of the local community and the context of the project. Caltrans policies, practices or mandatory design standards allows sufficient flexibility in order to encourage independent designs that fit the needs of each situation.

Application of Standards: The policies, practices or mandatory design standards used for any project should meet the minimum guidance given to the maximum extent feasible, but the philosophy provides for the use of nonstandard design when such use best satisfies the concerns of a given situation. Deviations from the Caltrans policies, practices or mandatory design standards requires review and approval for nonstandard design through the exception process (see Index 82.2 of the Highway Design Manual) and should be discussed early in the planning and design process.[14]

The above excerpts indicate that it is appropriate (perhaps required) to consider the principles of CSS for the AIP improvements. However, in the SOCTIIP SEIR/DIES, the AIP conceptual design did not incorporate any of the CSS design approaches. The AIP-R is guided by the policy outlined above, which encourages the use of "independent designs that fit the needs of each situation."

ITE Freeway and Interchange Geometric Design Handbook

An additional source of relevant guidance is the *Freeway and Interchange Geometric Design Handbook* published by the Institute for Transportation Engineers (ITE)[15], which provides guidance to the relative benefits and appropriate uses of different interchange types.

DESCRIPTION OF AIP-R ALTERNATIVE

Using the design philosophy and guidelines from the above documents, this report identifies refinements to the AIP alternative that are capable of avoiding virtually all of the impacts to property described in the SEIR.

The resulting AIP-R alternative has the same I-5 lane configuration as the AIP-SEIR, as summarized in Table 1, below. Both the AIP-SEIR and the AIP-R alternatives add an HOV lane in each direction between the El Toro interchange and the Orange/San Diego County line. In addition, auxiliary lanes are included in the AIP-R alternative in appropriate locations, consistent with the AIP-SEIR alternative. Table 1 on the following page describes the existing lane configuration for each segment of I-5, and the lane configuration for the AIP-R and AIP-SEIR alternatives.

Project Area Maps

Maps 1 through 9, attached to this report, show the approximate limits of impact for this proposed configuration, major design components such as new ramps, bridge structures, drainage basins and potential property takings. These maps also show the locations where detailed drawings or cross sections are provided. In general, the construction limits for the mainline widening lie within the I-5 right of way, and impacts to private property primarily occur at interchanges. The maps also show the proposed location of extended drainage basins.

---

[14] California Department of Transportation Context Sensitive Solutions (CSS) Implementation Plan, 10/03/2002 http://www.dot.ca.gov/hq/oppd/context.

[15] *Freeway and Interchange Geometric Design Handbook*, Joel P. Leisch, P.E., Institute for Transportation Engineers, 2005.

The following sections discuss those locations in which the AIP-R proposes substantial changes to the AIP-DEIS design to avoid or minimize displacement impacts. These include several interchanges, as well as several stretches of I-5 in which changes to the cross sections of parallel frontage roads are proposed in order to accommodate the widening of I-5. Changes to the location and design of extended drainage basins are also summarized below and are discussed in greater detail in Appendix 2

Interchanges

Many of the interchanges on I-5 within the project area are congested and in need of improvement or expansion. Others are operating well in their current configuration, and can be adapted to work with the widened I-5 with relatively minor changes. Most of the purported impacts to private property of the AIP-SEIR were at the interchange areas. In several cases, particularly at Crown Valley, Oso Parkway, Avenida Pico, and El Camino Real, radical expansions or complete re-designs of the existing interchanges were included in the AIP-SEIR without any analysis or justification. Many of the AIP-SEIR interchange designs involved conversion to "parclo", or partial cloverleaf interchanges. This design requires a very large footprint and is typically not desirable in urban areas where property values are high and displacement impacts are a concern.

Given the urbanized nature of the I-5 corridor through southern Orange County, it is important to consider the full range of interchange designs that will provide acceptable levels of service. Some interchange configurations can achieve desirable traffic operations with much smaller footprints, and are often used in urban areas. The use of these alternate types for the AIP alternative greatly reduces displacement. It is also appropriate to consider more sophisticated design and construction techniques, including more use of retaining walls to tighten slopes, due to the urban context and high property values in southern Orange County.

Table 2 shows the interchanges within the project area, and summarizes the original AIP design, and shows the alternative designs for the AIP-R alternative. The interchange designs as shown for the AIP-R alternative provide sufficient capacity to serve the I-5 interchange ramp volumes cited in the SEIR, in particular on Table E-40 of Appendix E of the Traffic and Circulation Technical Report. This table provides the projected AM and PM peak hour volumes for each interchange ramp for the "design year" of traffic, 2025. These volumes are the basis for the design of interchanges, and indicate how much capacity, i.e. how many lanes of travel, will be needed for each ramp. For the AIP-R design, ramp capacity is assumed to be 1,000 vehicles per hour per lane for exit ramps with a signal, and 1,500 for entrance ramps that are merging onto I-5. These are slightly more conservative than the assumptions outlined on Table E-40. The proposed improvements for the interchanges that are described in the following sections will provide adequate traffic capacity for the projected 2025 peak hour volumes.

Table 1: I-5 Existing Lanes and Proposed Improvements by Segment for AIP-SEIR and AIP-R

Segment			Southbound			Northbound				
	From	To	Aux	GP	HOV	HOV	GP	Aux	AIP Improvements	Final Lane Configuration
A	Lake Forest	El Toro	1	5	2	1	5	1	NB HOV	1 - 6 - 2 - 2 - 6 - 1
B	El Toro	Alicia	1	4	1	1	5	1	NB HOV/SB HOV	1 - 4 - 2 - 2 - 5 - 1
C	Alicia	La Paz	1	4	1	1	4	1	NB HOV/SB HOV	1 - 4 - 2 - 2 - 4 - 1
D	La Paz	Oso	0	4	1	1	4	0	NB HOV/SB HOV	0 - 4 - 2 - 2 - 4 - 0
E	Oso	Crown Valley	0	4	1	1	4	1	NB HOV/SB HOV	0 - 4 - 2 - 2 - 4 - 1
F	Crown Valley	Avery	1	4	1	1	4	1	NB HOV/SB HOV	1 - 4 - 2 - 2 - 4 - 1
G	Avery	SR 73	0	4	1	1	4	0	NB HOV/SB HOV	0 - 4 - 2 - 2 - 4 - 0
H	SR 73	Jun. Serra	1	5	1	1	4	0	NB HOV/SB HOV	1 - 5 - 2 - 2 - 4 - 0
I	Jun. Serra	Ortega	1	4	1	1	5	0	NB HOV/SB HOV	1 - 4 - 2 - 2 - 4 - 1
J	Ortega	Camino Capistrano	0	5	0	0	4	1	NB HOV + Aux SB HOV + Aux	1 - 5 - 1 - 1 - 5 - 1
K	Camino Capistrano	Pac Coast Hwy (SR 1)	0	5	0	0	4	1	NB HOV/SB HOV	0 - 5 - 1 - 1 - 4 - 1
L	Pac Coast Hwy (SR 1)	Estrella	1	4	0	0	5	1	NB HOV/SB HOV	1 - 4 - 1 - 1 - 5 - 0
M	Estrella	Vista Hermosa	0	4	0	0	4	0	NB HOV/SB HOV	0 - 4 - 1 - 1 - 4 - 0
N	Vista Hermosa	Pico	1	4	0	0	4	1	NB HOV/SB HOV	1 - 4 - 1 - 1 - 4 - 1
O	Pico	Palizada	1	5	0	0	4	0	NB HOV + Aux SB HOV + Aux	1 - 4 - 1 - 1 - 4 - 1
P	Palizada	Presidio	1	4	0	0	4	0	NB HOV + Aux SB HOV + Aux	1 - 4 - 1 - 1 - 4 - 1
Q	Presidio	El Camino Real	0	4	0	0	4	0	NB HOV + Aux SB HOV + Aux	1 - 4 - 1 - 1 - 4 - 1
R	El Camino Real	Califia	1	4	0	0	4	1	NB HOV/SB HOV	1 - 4 - 1 - 1 - 4 - 1
S	Califia	Cristianos	0	4	0	0	4	0	NB HOV/SB HOV	0 - 4 - 1 - 1 - 4 - 0
T	Cristianos	Basilone	0	4	0	0	4	0	none	0 - 4 - 1 - 1 - 4 - 0

Source: Table 2-1, Summary of I-5 Improvements in the AIP and I-5 Alternatives, 176010TrafficReportSection 2.0.doc

Table 2: Interchanges on I-5 - Comparison of AIP-SEIR with AIP-R

	Street Name	Existing	AIP-SEIR	AIP-SEIR Displacement Impacts	AIP-R Options	AIP-R Displacements
1	El Toro	T SB, Diamond NB	T SB, Parclo NB plus additional SB exit ramp just south of interchange.	***High***	***SPDI***	***Minimal***
2	Alicia	Parclo	Parclo with rectangular Detention Basin	Moderate	Parclo with re-shaped detention basin	None
3	La Paz	Parclo	Re-aligned Parclo	Minimal	Parclo-Maintain existing alignment	Minimal
4	Oso	Parclo	Parclo	None	Parclo	None
5	Crown Valley	Diamond SB/parclo NB	Full Parclo	***High***	***SPUI or Flyover***	***Moderate***
6	Avery	Diamond	Diamond	None	Diamond	None
7	SR 73	Flyover	Re-aligned Flyover	Minimal	Flyover-Maintain existing alignment	None
8	Junipero Serra	Diamond	Diamond	Minimal	Diamond	Minimal
9	Ortega	Diamond	Parclo	***High***	***SPUI or TUDI***	***Moderate***
10	San Juan Creek	Double – T	Double – T	Minimal	Double – T	Minimal
11	SR 1/Pacific Coast Hwy	Parclo with NB flyover	Parclo with nb flyover-realigned	Moderate	Parclo with nb flyover-Maintain existing alignment	
12	Estrella	Diamond SB/parclo NB	Diamond SB/parclo NB	Minimal	Diamond sb/parclo nb	Minimal
13	Vista Hermosa	Parclo	Parclo-Slightly re-aligned	Minimal	Parclo-Maintain existing alignment	None
14	Pico	Diamond	Parclo	***High***	***SPUI or three level***	***Moderate***
15	Palizada	Slip ramps to and from north	Slip ramps to and from north-realigned	Moderate	Slip ramps to and from north-Maintain existing alignment	Minimal

16	Presidio	Slip ramps to and from south plus on-ramp to north	Slip ramps to and from south plus on-ramp to north	Moderate	Close northbound on-ramp	None
17	El Camino Real	Diamond plus northbound T to south	Double T with relocation of El Camino Real	Very high	***Combine nb ramp with Califia, maintain existing sb ramps***	***Minimal***
18	Califia	Double T	Close SB due to proximity to El Camino Real, maintain NB ramp	None	Close sb, Maintain T northbound	None
19	Cristianos	Diamond	Diamond	None	Diamond	None

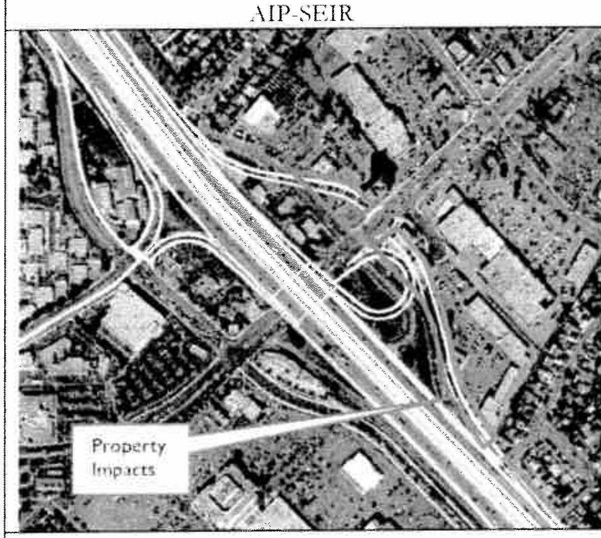
Displacements: Minimal = only minor property acquisition required, with no displacements of residential or commercial buildings.
Moderate = fewer than 10 displacements; High = 11 to 25 displacements; Very high = more than 25 displacements

The following sections discuss each interchange and provide illustrations comparing the designs of the AIP-SEIR and the AIP-R where substantial changes are proposed.

El Toro Road Interchange

The AIP-SEIR included radical changes for the northbound ramps for this interchange, as shown on the left side of Figure 2. While the existing partial cloverleaf of the northbound on-ramp does not meet current design guidelines, there are other interchange type alternatives that are appropriate for constrained urban settings and for the projected traffic volumes. The AIP-R proposes a single point diamond interchange (SPDI), as shown below in Figure 2 at the right. This design results in only minor property impacts, and only partial takings. In addition, impacts are further reduced as the AIP-R provides room for the extended detention basin to be relocated without displacing any buildings.

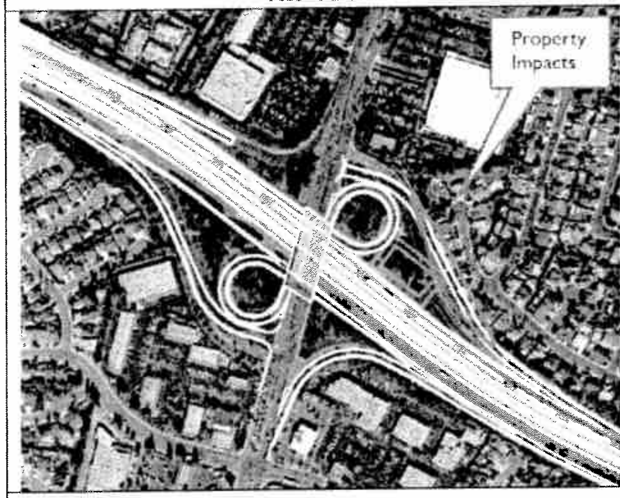
Figure 2: El Toro Road Interchange: AIP-SEIR and AIP-R

AIP-SEIR	AIP-R
	
High property impacts from northbound on-ramp cloverleaf, and from extended detention basin in residential neighborhood.	Takings reduced to minor partial takings (i.e. property only, no buildings) with single point diamond interchange and relocated detention basin.

Alicia Parkway Interchange

This interchange is proposed to remain in its current general configuration, which is a partial cloverleaf (par-clo). However, the AIP-SEIR places a large rectangular detention basin between the northbound ramp and mainlines, which creates the need to relocate the ramps into a residential area, resulting in property takings. The simple refinement of re-shaping the detention basin to fit within the cloverleaf allows the property takings to be completely avoided in the AIP-R alternative. Both alternatives are shown in Figure 3.

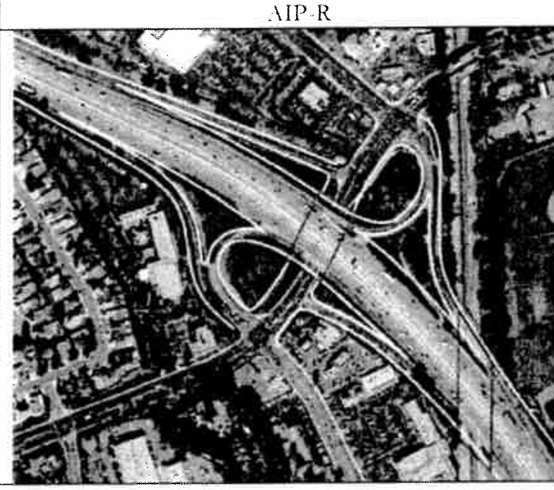
Figure 3: Alicia Parkway Interchange: AIP-SEIR and AIP-R

AIP-SEIR	AIP-R
	
Rectangular detention basin forces ramp into residential area, resulting in property takings.	Detention basin re-shaped to fit within interchange area, avoiding property takings

La Paz Road Interchange

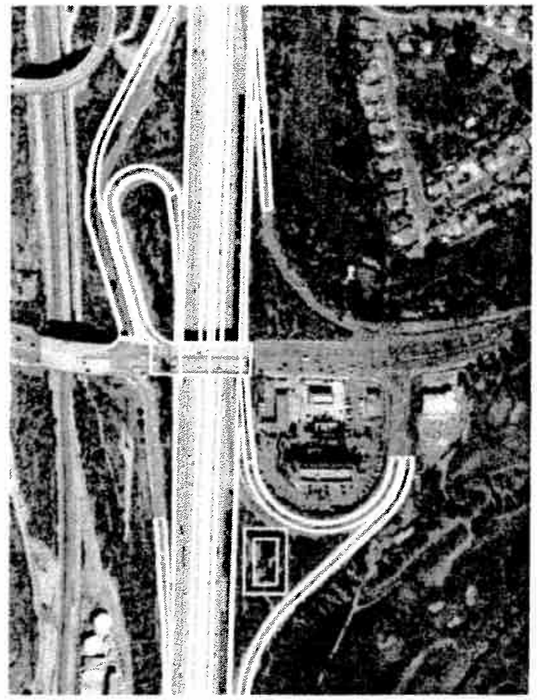
This interchange has a par-clo ramp configuration that does not fully meet current guidelines. However, the design is not dramatically substandard. The AIP-SEIS plan results in the taking of several commercial properties abutting the southbound ramps. Two options are presented for this interchange, and both will eliminate these takings. One is to maintain the current ramp configuration, which will result in slightly tighter radii for the ramps; the other is to convert this interchange to single point diamond, which is highly suitable for this location, and would provide ample capacity for the traffic volumes. Figure 4 shows the first option described for this interchange for the AIP-R.

Figure 4: La Paz Road Interchange: DEIS and AIP-R

AIP-SEIR	AIP-R
	
Curvature of ramp is reduced, resulting in commercial displacements	Maintain existing interchange geometry; widen La Paz crossing to provide improved capacity.

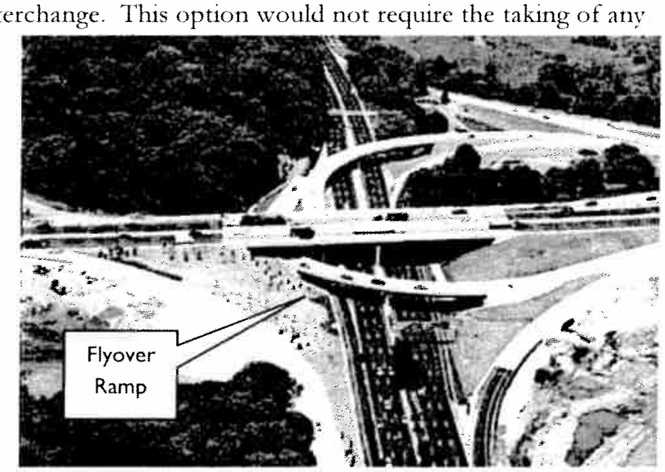
Oso Parkway Interchange

The AIP-SEIS proposed design for this interchange is just a slight modification of the existing interchange design, which did not result in any property takings. The AIP-R proposed the same design for this interchange.



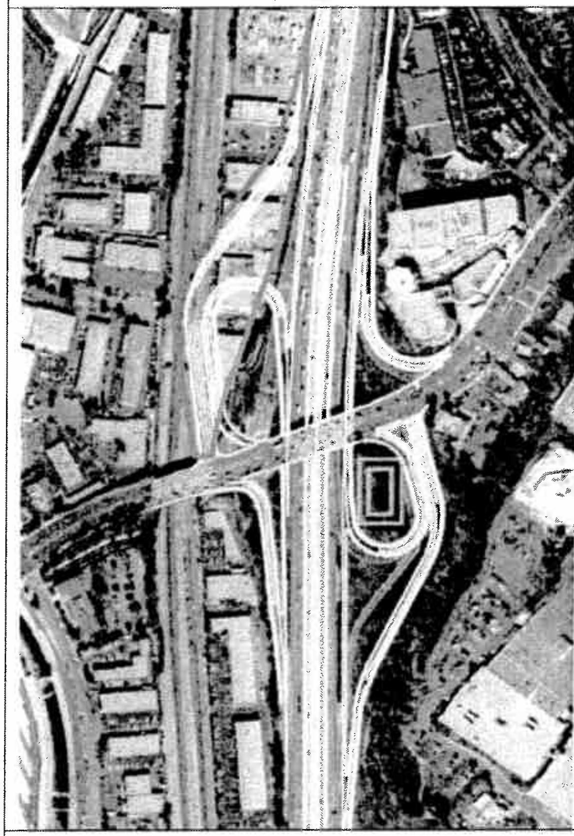
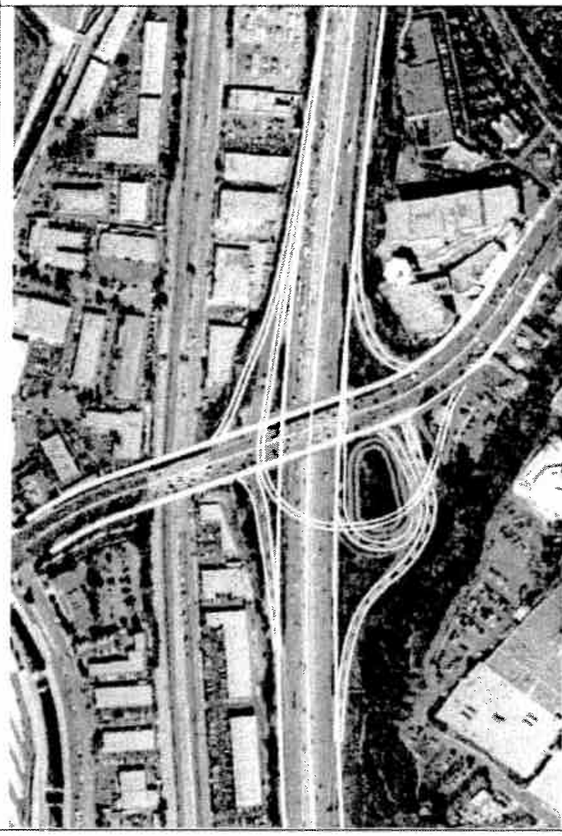
Crown Valley Interchange

The AIP-SEIS proposed a significant redesign that would convert this interchange into a partial cloverleaf configuration. This results in significant takings of property along the southbound ramps. The AIP-R proposes two options for this interchange. This first is a single point diamond interchange (SPDI), which essentially fits into the footprint of the existing interchange. This option would not require the taking of any existing buildings. The second option is to maintain the existing partial cloverleaf ramp for the northbound I-5, and construct a flyover ramp for southbound exiting left turns. (An example of a recent interchange improvement along the high volume Long Island Expressway is shown at right, which was developed as a context sensitive solution in a wetland area). This would involve the construction of several structures for the ramps, and require the acquisition of two properties. The crossing of Crown Valley over I-5 would be a much smaller structure than the SPDI, however, so the costs may not be substantially different. The capacity of the interchange would be higher with the flyover, and due to the high growth to the east along Crown Valley, this may be the preferred solution. However, either of these options would provide sufficient traffic capacity. The property acquisitions required for the flyover ramp are assumed in the later section on property impacts, even though they would not be required with the SPDI option. Figure 5 shows the plan in the SEIR for this interchange, as well as the flyover ramp option for the AIP-R plan.



Source: Better Roads Magazine, March 2005

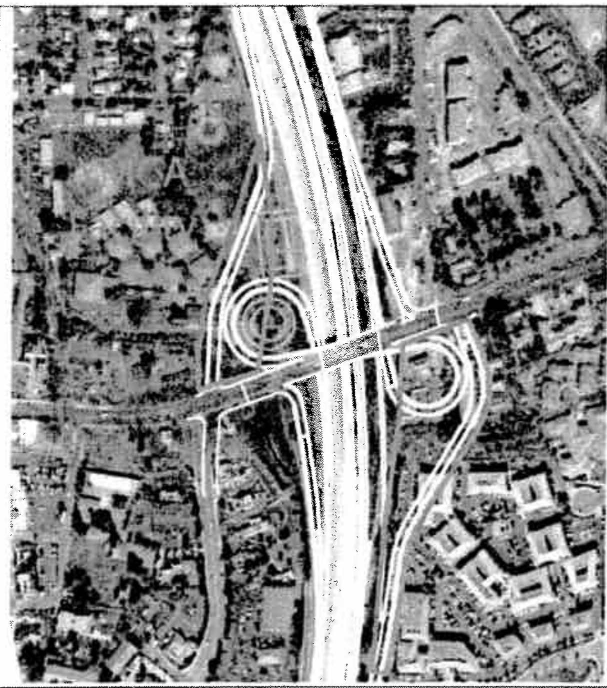
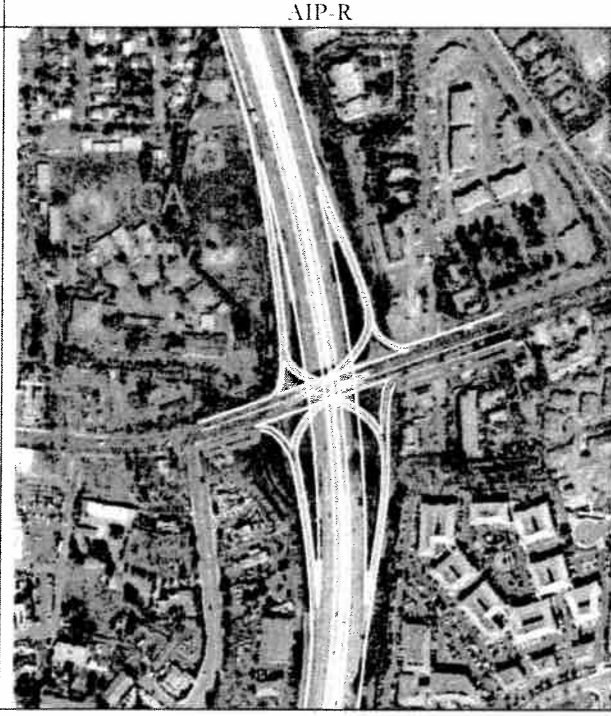
Figure 5: Crown Valley Parkway Interchange: AIP-SEIR and AIP-R

AIP-SEIR	AIP-R
	
Significant property takings along the southbound lanes would be required to construct the plan for this interchange proposed in the AIP-SEIR.	The southbound flyover would require several structures, but would result in fewer takings of smaller properties.

Ortega Parkway Interchange

This interchange is currently very congested, and in need of improvements and additional capacity. However, this interchange's location adjacent to an historic district and a YMCA property, protected by Section 4(f), requires consideration of context-sensitive solutions. The partial cloverleaf design proposed in the AIP-DEIS is a highly inappropriate for this location, and results in massive impacts to protected properties. The two most appropriate and cost effective interchange types for this location are the Tight Urban Diamond Interchange (TUDI), or the single point diamond (SPDI). Both options would require the significant widening of Ortega Highway over I-5, and therefore result in some property impacts to three small roadside commercial properties. However, the section 4(f) YMCA property would not be impacted. An example of a SPDI is shown on the interchange concept plan in Figure 6], and a TUDI design would also fit within the right-of-way.

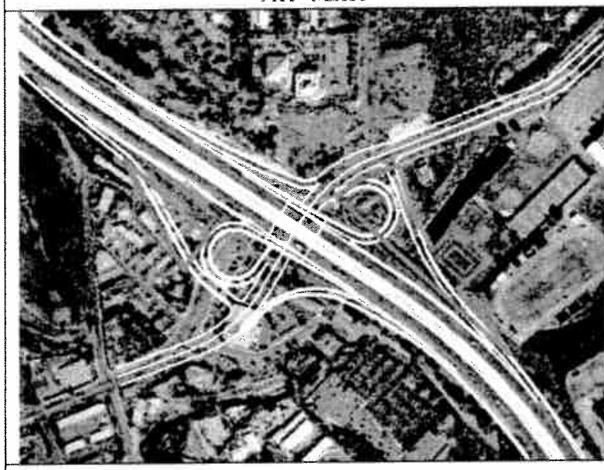
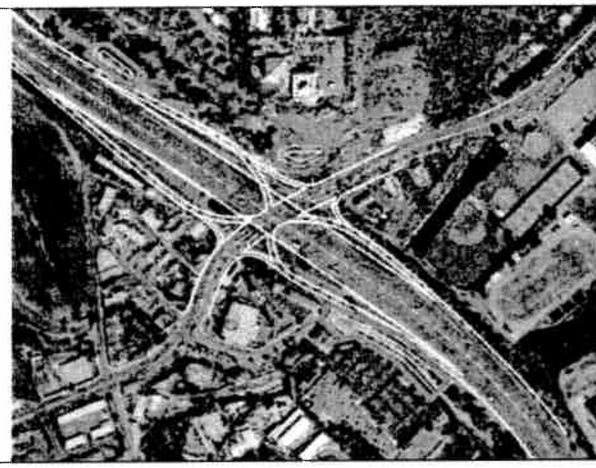
Figure 6: Ortega Parkway Interchange: AIP-SEIR and AIP-R

AIP-SEIR	AIP-R
	
Significant property impacts occur to the YMCA facility (northwest quadrant of the interchange), as well as to commercial properties.	Single Point Diamond interchange would provide adequate traffic capacity, and result in nor more than three full takings and two partial takings of small commercial properties on the south side of Ortega Highway. Detention basins replaced by 8D-8G per Runoff Management Plan.

Avenida Pico Interchange

Again, the AIP-SEIR applies the Partial Cloverleaf interchange to this location, which results in massive impacts to both commercial property and a school site, protected by Section 4(f). Either a split diamond interchange or single point interchange can provide ample capacity at this interchange for the design year traffic. This interchange lies within the City of San Clemente, which provides traffic projections for all of the major roads in the City. These volumes were used to conduct more detailed traffic analysis than is possible for the other interchanges. Figure 7 shows the AIP-SEIR compared to the AIP-R.

Figure 7: Avenida Pico Interchange: AIP-SEIR and AIP-R

AIP-SEIR	AIP-R
	
The partial cloverleaf results in substantial takings of commercial properties, as well as an impact to school property from a proposed detention basin.	The single point diamond eliminates all property takings. The detention basins are relocated as shown, and as described in the Runoff Management Plan, and do not result in displacement of buildings

Presidio Interchange

The AIP-SEIR maintains the current configuration of this interchange, but due to the excess widening assumed for this section, this results in some property displacements. The AIP-R Alternative includes the closure of the northbound on-ramp at this interchange, as there is another on-ramp just north at Palizada, and the close spacing of these two ramps does not comply with CalTrans guidelines[16].

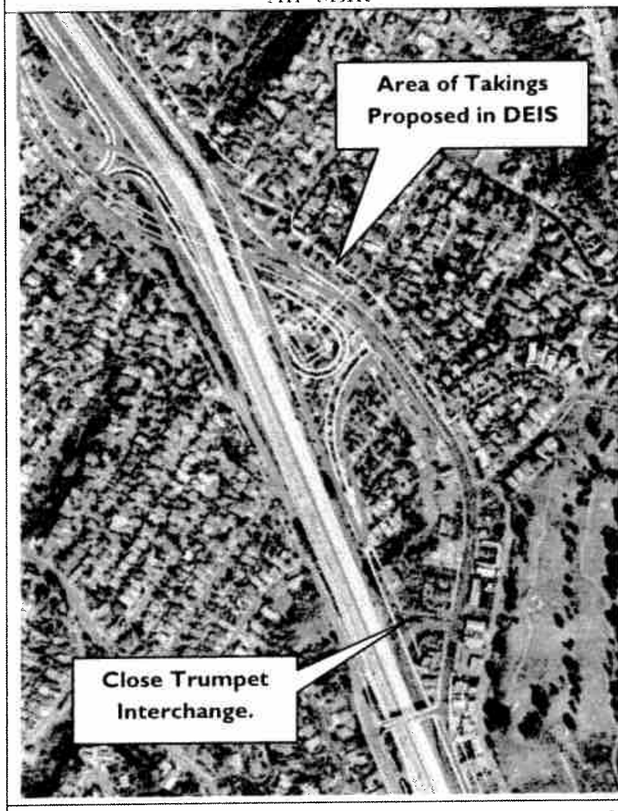
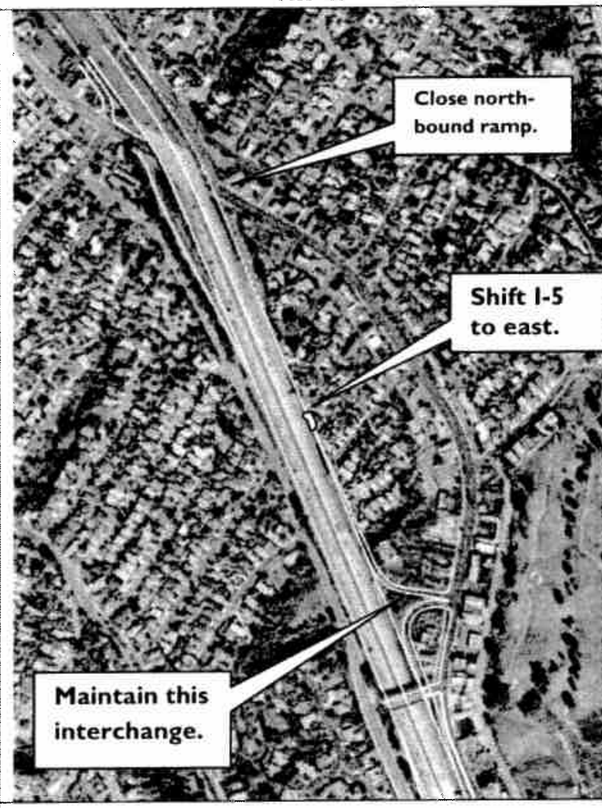
El Camino Real Interchange

The AIP-SEIR assumed massive property impacts at this location, due to complete reconstruction of the interchange and realignment of El Camino Real. However, the improvements proposed for this interchange in the AIP alternative are identical to those shown in the I-5 alternative, indicating that the number of lanes assumed for this section is excessive, and not warranted by the projected traffic volumes. The AIP-R alternative adds only one HOV lane in each direction, such that complete reconstruction of the interchange is not warranted. The following figure shows the proposed interchange design for this interchange. The AIP-R plan includes closing the northbound ramp at the El Camino Real interchange, and replacing with the existing ramp, just to the south, also exiting to El Camino Real. These interchanges are more closely spaced than desirable, and this change will improve safety. The volumes for these interchange ramps are very moderate, so the new ramp configuration will easily provide sufficient peak hour capacity for the year 2025.

Figure 8 shows on the left side the interchange design proposed for El Camino Real in the SEIR, which results in massive property impacts. On the right is the design proposed for the AIP-R, which provides adequate traffic capacity for the projected future traffic volumes.

[16] *Highway Design Manual*, California Department of Transportation, November 1, 2001, Section 503-1, page 500-1.

Figure 8: AIP-SEIR Proposed Reconstruction of El Camino Real/I-5 Interchange in San Clemente and AIP-R alternative

AIP-SEIR	AIP-R
	
The AIP-SEIR proposed complete reconfiguration of this interchange, including a partial cloverleaf and detention basin for the northbound, and trumpet for the southbound.. The SEIR does not include discussion of the closure of the existing northbound trumpet interchange just south.	The southbound I-5 interchange remains generally in its existing configuration as a tight diamond. The northbound ramp is closed, and the trumpet just to the south is improved. The centerline of I-5 is shifted slightly to the east , resulting in 8 residential property impacts. The detention basin has been combined with an enlarged EDB 1-B, as described in the Runoff Management Plan.

The AIP-R alternative reconfigures this interchange to operate at good levels of service, while avoiding the massive property impacts that were proposed in the SEIR.

Arterial Intersections

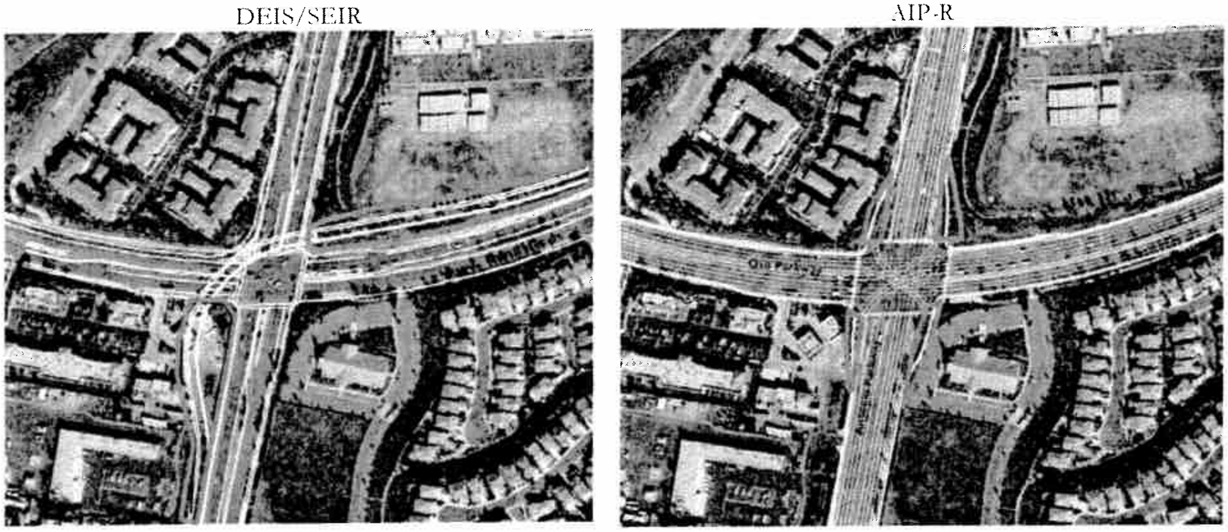
In addition to the improvement along the I-5 corridor, the AIP-SEIS and AIP-R include improvements to several arterial corridors. Most of these can be accommodated within the publicly owned right-of-way, and therefore do not result in property impacts. Several intersections will require increased capacity, however, and improvements are proposed. The following sections discuss each intersection.

Oso/Antonio Parkway Intersection

The SEIR recommended a grade separation at this intersection with a flyover, which resulted in significant property impacts. In addition, these improvements would create an environment for pedestrians that is even more hostile than the current conditions. The AIP-R alternative will construct a tight urban diamond grade separation, with urban design features that will create reasonably safe and convenient pedestrian crossings. These pedestrian features will also serve to improve the transit environment in the corridor, so that transit riders can safety access their trip origins and destinations. Figure 9 compares the area of impact at this intersection in the SEIR with that proposed in this AIP-R alternative. The AIP-R alternative will only require very minor land acquisition at the intersection corners, and will provide a more attractive, transit and pedestrian oriented design that provides adequate vehicular level of service. The AIP-SEIS proposes a flyover ramp to accommodate the left turns between Oso Parkway eastbound and Antonio Parkway southbound. This ramp will result in a costly, unattractive feature that will greatly increase traffic speeds. This will contribute to a more hostile environment for pedestrians, which is not appropriate for a location that is a focus of development and future transit service. A later section of this report describes additional ways to enhance the AIP-R alternative and promoting transit use in the corridor by design.

Figure 9: Antonio Parkway/Oso Parkway Intersection Designs

DEIS/SEIR | AIP-R



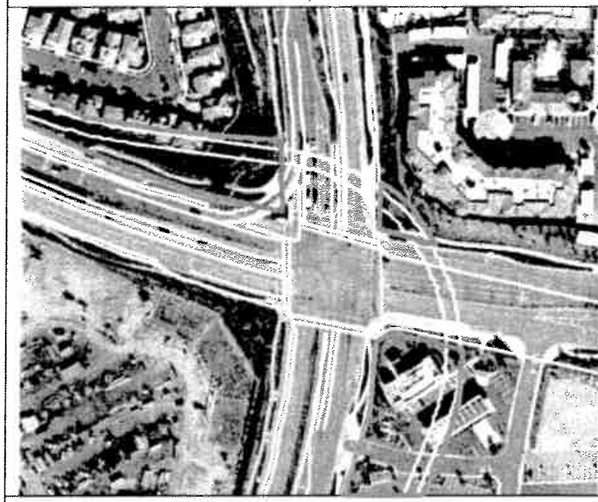
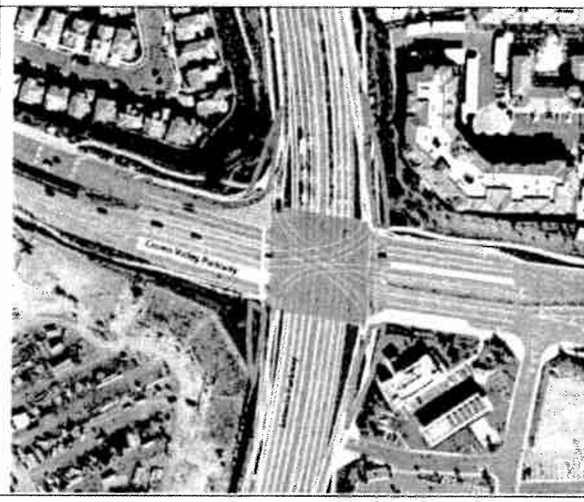
Major impacts to commerical properties from flyover ramp between Oso Parkway westbound and Antonio Parkway southbound.

Construction of a tight urban diamond interchange will provide adequate level of service with only very minor property takings. This also provides a much better pedestrian environment for future transit riders.

Crown Valley/Antonio Intersection

Figure 10 shows the AIP-SEIR plan and the proposed AIP-R plan, which consists of a tight urban diamond interchange, which will allow Antonio to have six through lanes that are grade separated from Crown Valley Parkway. Turning lanes at the ramps will be provided, and Crown Valley will not need to be widened from its current paved width. This plan will provide adequate traffic capacity, and far improved pedestrian and transit environment compared to the costly plan presented in the SEIR. It will also eliminate full takings of property, and require at most minor corner areas.

Figure 10: Crown Valley/Antonio Parkway Intersection Designs

DEIS/SEIR	AIP-R
	
Massive residential and commercial takings to construct flyover ramp to Crown Valley	Construct a grade-separated tight urban diamond. Antonio Parkway has 3 lanes each direction under Crown Valley. This provides adequate capacity and a more pedestrian oriented environment..

Ortega/ Antonio Intersection

This intersection is proposed for grade separation. While the SEIR plan does impact agricultural land uses, it does not impact residential or commercial properties. Figure 11 shows the AIP-SEIR plan for this intersection.

Figure 11: Ortega Highway/Antonio Parkway AIP-SEIS Arterial Improvements

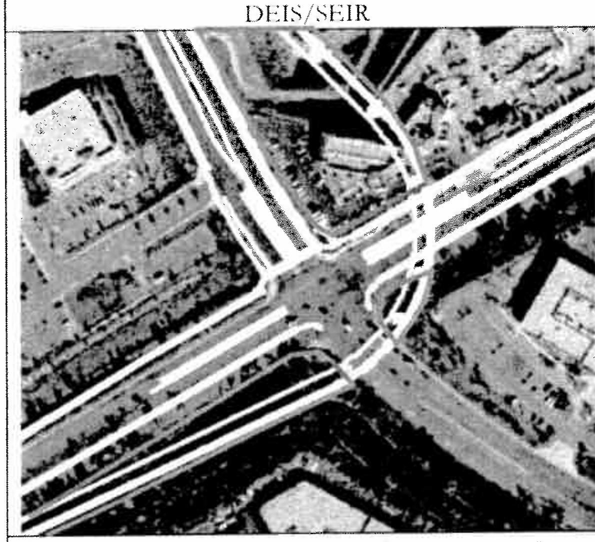
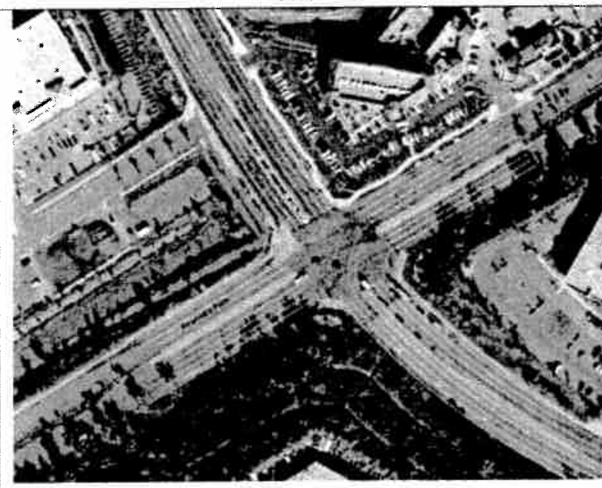
Pico/La Pata Intersection

At grade mitigation found to be sufficient in SEIR[17], which was found to provide Level of Service C in the morning peak hour, and D in the afternoon peak hour. Despite this good level of service, the SEIR assumed grade separated plan for this intersection, which resulted in takings of commercial properties. Figure 12 compares the AIP-SEIS plan to the AIP-R plan. The AIP-R relies on the at-grade mitigation improvements for this intersection described in the SEIR, and will provide adequate level of service.

---

[17] SOCTIIP SEIR, Traffic and Circulation Technical Report, Appendix F, Table F-40,. Page. F-157, December 1, 2003.

Figure 12: Avenida Pico/La Pata Intersection Designs

DEIS/SEIR	AIP-R
	
Substantial takings result from a flyover ramp from Pico eastbound to La Pata northbound. However based on the SEIR analysis, this ramp is not necessary to provide adequate levels of service.	At-grade improvements result in only minor partial takings of property along the southbound approach of La Pata. This "at grade mitigation" plan was found to have good levels of service in the SEIR.

I-5 Cross Sections

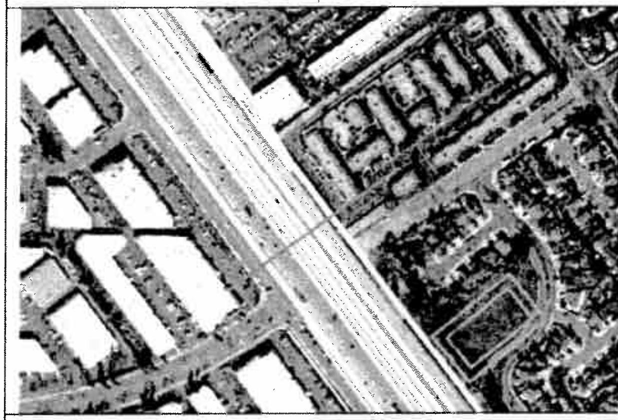
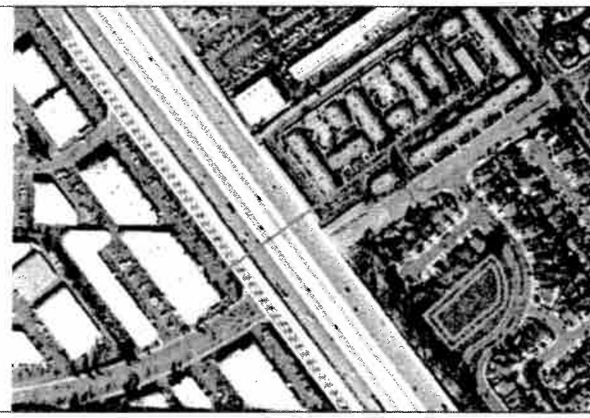
The overview maps also show locations where typical cross sections have been prepared to illustrate existing and proposed conditions, and how the design will affect roadside property. These have been specifically prepared for the most constrained locations, to illustrate how the additional lanes will fit into the available right-of-way. While the areas have not been surveyed, these cross sections reflect typical conditions with sufficient detail to determine the likely extent of property impacts, and to illustrate the proposed future road conditions. In some cases, the cross sections show reallocation of existing frontage roads, in locations where volumes can be accommodated on narrower cross section.

The AIP plans from the SEIR included long segments of sound barriers, which further increased the purported property impacts of the AIP-SEIR. However, no noise modeling was conducted to determine if the sound barriers are necessary per FHWA guidelines, or desirable, so it is premature to specifically locate sound barriers. For the AIP-R alternative, sound walls should be installed where deemed necessary after a comprehensive noise analysis and design. The AIP-R provides a buffer between the edge of the road and adjacent properties of at least 10 feet, which is ample for a sound wall barrier. Therefore, sound walls will not result in increased property impacts.

Cross Section A, Laguna Hills: Ave de la Carlota

This is one of two cross section areas in which it is proposed that the frontage road cross section be re-allocated for I-5 widening in order to avoid right-of-way impacts. Avenida de la Carlota is a frontage road that runs parallel to I-5, just west of the right-of-way. In this section, traffic volumes range on Avenida de la Carlotta from 12,000 to 18,000 vehicles per day. These volumes can be adequately served by a three lane cross section, with one travel lane in each direction and a center left turn lane where needed, as shown in Figure 13.

Figure 13: Mainline Widening at Avenida de la Carlotta

DEIS/SEIR	AIP-R
	
AIP-SEIR widens on east side of I-5, resulting in takings of commercial and residential property.	AIP-R widens I-5 on west side, creating room for widening by re-striping of Ave de la Carlotta.

Cross Section of I-5 and Ave de la Carlotta

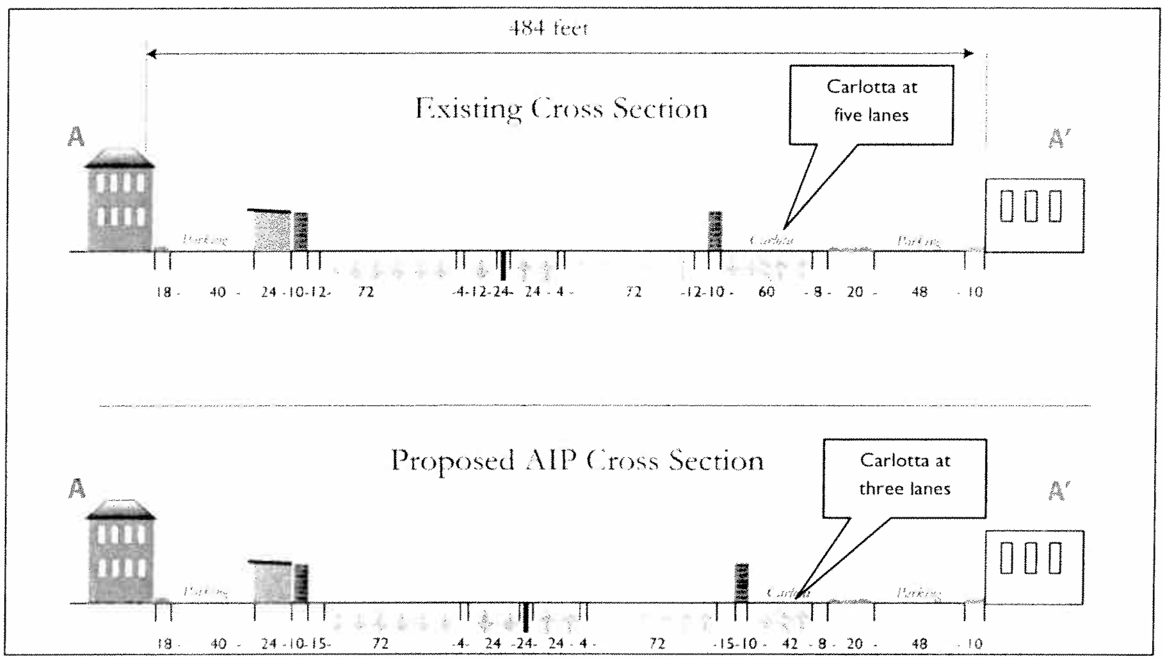


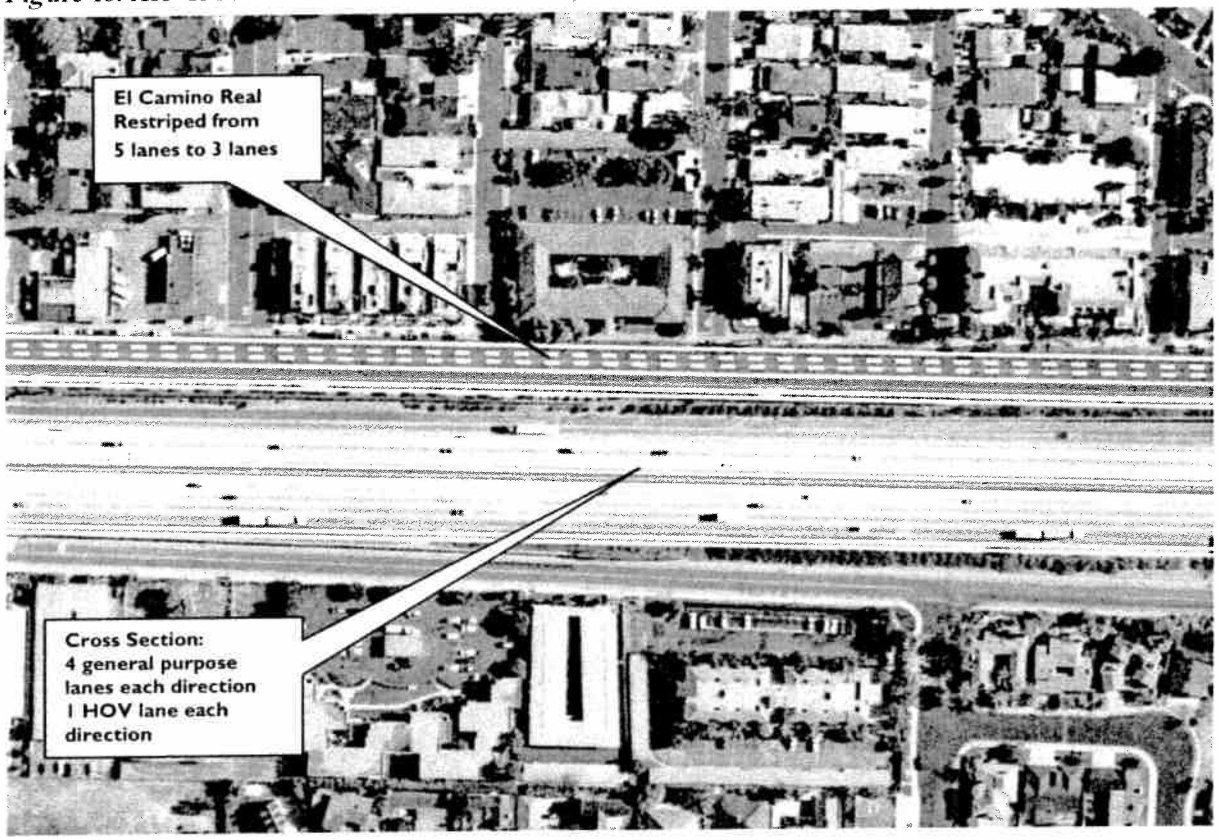
Figure 14: Avenida de la Carlota, 12,000 ADT

Cross Section S: El Camino Real, San Clemente

In this cross section, at the southern-most part of the AIP-R alternative, I-5 is paralleled by El Camino Real in San Clemente. The AIP-SEIR included massive property takings in this area; however, the widening proposed in this location is one lane in each direction PLUS one HOV lane in each direction. This is in excess of what is described as the AIP alternative, which is described as the addition of only one HOV lane in each direction in this location The purported impacts are vastly overestimated for this location in the SEIR due in part to excessive widening, and in part due to lack of creativity in design. Figure 15 shows an excerpt from the AIP-SEIR for this section, and Figure 18 shows the AIP-R plan for this section.

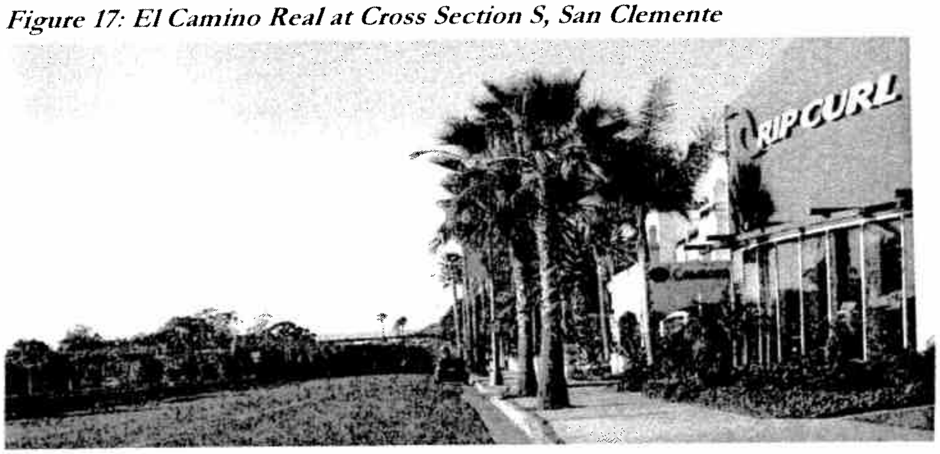
Figure 15: AIP-SEIR Plan for I-5 at Cross Section S, El Camino Real, San Clemente

Figure 16: AIP-R Plan for I-5 at Cross Section S, San Clemente



This section of El Camino Real has low traffic volumes, ranging from 4,000 ADT to 7,000 ADT[18]. These volumes are very easily accommodated by a narrower cross section, which is proposed to be three lanes (one lane each direction plus left turn lane). Due to the nearby beaches and adjacent shops, there is significant pedestrian and bicycle traffic. The environment for pedestrians and bicyclists on this portion of El Camino Real would be dramatically improved by the conversion to a three lane cross section, as it will result in slower but steady traffic speeds, narrower crossing distances for pedestrians, and increased safety.

Figure 17: El Camino Real at Cross Section S, San Clemente



[18] Orange County Transportation Authority, Traffic Volume Map, 2005, http://www.octa.net/pdf/2005.pdf

Runoff Management Plan

The AIP-SEIR plan included large detention basins that are required to improve water quality in this sensitive area. As with the highway design features of the AIP-SEIR plan, the detention basin designs were placed without considering the property impacts, and no efforts to refine the designs were conducted. Again, there are many opportunities to substantially reduce property takings by relatively minor refinements to the runoff management plan. Appendix 2 contains a detailed description of the plan, and of the changes to each proposed detention basin in the AIP-R.

This revised plan has been developed that reduces impact to developed areas by locating detention basins in undeveloped areas. Similar methods and criteria were used in order to aid in comparison between plans proposed in the SOCTIIP AIP and the AIP-R. The runoff management plan includes detention basins that are larger than what may be needed for the added roadway in order to:

- Treat runoff from adjacent existing roadway
- Double the detained water volume to increase infiltration and reduce runoff.

While detaining water in shallow larger basins and increasing infiltration is becoming favored for many new developments in order to limit adverse effects on streams and other downstream areas, the criteria used (doubling of the required water quality volume, doubling the size of the basins) does not have an explicit basis. Also, increased ground water may not be desirable in some instances – such as adjacent to homes or near coastal bluffs that could be destabilized.

Property takings from the runoff management plan are combined with the entire AIP-R alternative, and discussed in more detail in the following sections. Essentially, the property impacts from the runoff treatment system were reduced to only partial takings of undeveloped areas or parking lots. Many basins were re-shaped so that they could fit into available areas at the interchanges.

Further Enhancements to the AIP-R Alternative

The following sections describe in conceptual terms several possible further improvements that would enhance the mobility improvements provided by the AIP-R alternative. These are not included at this time in the cost estimates, but are described in order to show the opportunities that exist to further enhance the mobility in the I-5 corridor.

Enhanced Transit Component for the Arterials Improvement Plan (AIP)

To be a more complete transportation alternative/plan, the AIP should incorporate enhanced transit service, appropriate to the land use and urban geography of the south Orange County area. An alternative that replaced the south FTC corridor with a light rail transit system was correctly deemed infeasible and eliminated from further study due to the lower density nature of the south county area and the lack of connection to destinations[19]. There is quite a range of transit services available between standard local fixed-route bus service and light rail transit, however, many of which are offered by OCTA in the northern portions of the county. A more realistic plan for providing enhanced transit service as a complement to the improved arterials plan in the south county area should be given consideration.

With respect to transit, the SOCTIIP Final SEIR (December 2005) states the traffic model assumptions as follows: "..*The OCTAM 3.1 traffic model, which is the basis for the traffic forecasting for the SOCTIIP,*

[19] Pushkarev and Zupan, *Public Transportation and Land Use Policy*, Indiana University Press, 1977.

assumes the OCTA transit services that were in place in September 2000 for the base year conditions. The 2025 transit conditions in the OCTAM 3.1 model, used in SOCTIIP, assume that there will be improvements to select route headways, no new local routes, and an increase of approximately 50 percent in local bus service. Since there are no plans or funding committed to implementing a light rail system in Orange County at this time, none are assumed in the OCTAM 3.1 model…."

Without any specification as to the 'select' route headways that were improved, it is difficult to evaluate whether the transit services assumed for the 2025 horizon keep pace with the rate of new development in the south county area for this same time period. The statement asserts that future transit service will largely consist of increased headways on some existing lines and increases in local bus services. The south county area is primarily served by local bus and the Metrolink commuter rail service.

The following describes a more realistic enhancement of transit service more appropriate to the projected growth in the area and as a component of a more balanced AIP plan that has the potential attract choice riders (i.e., riders that would otherwise drive) and further improve transportation service in the south county.

Transit Services in Suburban Communities

Providing transit services in suburban areas is a more difficult task due to dispersed development patterns and lower overall development densities. However, with expanding congestion, increasing fuel prices and the 'greying' of the population (i.e., a growing proportion of seniors), improvements and innovations for transit service in suburban areas are evolving[20]. There is a diversity of transit service options provided within Orange County, but options beyond local fixed-route bus services are focused in the northern and central portions of the county. Overall, this area is more densely developed, has lower median incomes, lower automobile ownership rates and a more consistent grid pattern of roadways that lends itself to transit service and an efficient bus routing pattern[21]. With future population growth concentrated in the south county area, and employment growth in the central portion of the county, however, provision of enhanced transit service to this area is warranted.

Typical trip purposes that are served by suburban transit services include long-distance commuting, connections to the regional transit network, and community-to-community connections[22]. In Orange County, links to primary employment centers in the central and north county areas, links to the Metrolink commuter rail stations, the Irvine Transportation Center, and core community centers should form the bones of the transit network in the south county area. The following provides an overview of transportation services typically established in suburban areas:

Fixed Route—traditional transit service that follows a predetermined alignment and schedule. There are many variations on this service including peak-hour service, all-day service, as well as the following:

- Trunk
- Express
- Limited Service
- Circulators, and
- Shuttles and Feeders

[20] Transportation Research Board, TCRP Report 116, Guidebook for Evaluating, Selecting, and Implementing Suburban Transit Services, 2006.

[21] Orange County Transportation Authority (OCTA), *New Directions. Charting the Course for Orange County's Future Transportation System*, 2006

[22] TRB, 2006

Deviated Fixed Route Service—transit vehicles operate within a given service area, but has flexibility in their route between arriving at specific stops at specific time points. Examples of these flexible routes are:

- Circulators, and
- Shuttles

Demand Responsive Service—also called 'dial a ride' service that provides door-to-door service from a call in request.

Subscription Service—transit service to specific individuals that pay a subscription fee.

- Subscription commute buses and
- Vanpools

Innovations in Transit Services

Innovations in technology is an evolving area that is improving the dissemination of information related to schedule and operations to customers and service personnel and hence expedite transit service. Innovations include the following:

- ***Real-time information***, that informs customers and service providers on arrival times, operations related announcements, and so forth.
- ***Transit preferential treatment***, capital improvements such as queue jump lanes, traffic signal priority, dedicated transit lanes.
- ***Vehicle modifications***, such as low floor vehicles to expedite passenger boarding and decrease travel times; and
- ***Fare technologies***, such as smart cards, prepaid passes that expedite passenger boarding and decrease travel times.

Enhanced Transit Component of the AIP Alternative

Considering the physical and socio-economic characteristics of the south county, specifically the more moderate development densities, lower-levels of street connectivity, and higher income levels and car ownership rates, the following enhanced transit services provide an alternative to the light rail option that is more realistic. All of these options could be implemented at significantly lower costs than light-rail and using infrastructure that is currently in place. In each case, the enhanced transit alternative utilizes the HOV lanes on Interstate 5 as a core element of the system.

Express Bus

Express bus services are characterized by limited numbers of stops along a prescribed route in order to minimize the travel time along the route, in this setting serving community to community and long distance commuting. Express busses are particularly advantageous in areas with HOV networks and with queue jump lanes and signal priority capabilities in the urban street system. Express bus services can be accessed from park and ride lots, shuttle circulators, or transit stops. The OCTA currently provides express bus service (OC Express) from Pomona, Chino and Riverside to Santa Ana, Irvine, and the south coast utilizing HOV lanes along Route 91. With the planned expansion of HOV lanes on I-5, express bus services from south county communities to Irvine and the north county area would be greatly enhanced.

Bus Rapid Transit

Bus Rapid Transit (BRT) is another option. BRT has many of the advantages of rail transit, such as wider station spacing, expedited fare collection and boarding, 'smart technologies' such as intersection priority (queue jump capabilities) and real time schedule information that allow the faster travel times that attract choice riders, without the disadvantages and considerable capital costs associated with fixed guideway systems (such as LRT). OCTA's 2006 Long Range Transportation Plan identified several BRT corridors in the northern portion of the county, but does not identify a corridor in the south county area at this time. BRT could be implemented in addition to express bus services, or as a later phase of express bus service, as transportation conditions warrant.

Subscription Bus

Yet another option well-suited to the suburban environment is the subscription bus. Often offered by large institutions or employers that collect many riders and bring them to one location, such as vanpools or airport shuttles, subscription buses would similarly benefit from the regional HOV network to expedite the commute. Subscription services are often private or public-private partnerships that collect passengers at predetermined times and locations. With growing congestion in California's metropolitan areas, larger employers offer such commute services as a 'perk' to their workers[23].

Infrastructure Requirements

While all of these services can be implemented using the existing network of streets and highways, improvements to the arterial road system that would expedite transit services would benefit all of the bus transit options described above and improve transit ridership by providing a time advantage that the local fixed-route bus service cannot provide. At the core of the system is the HOV network, but improvements to local and regional arterials are also desirable, as follows:

New Roadway Construction: New arterials, such as Antonio Parkway, should incorporate specific design improvements and made to be 'transit-ready' as a part of new construction. A dedicated transit lane or mixed flow lanes with queue-jump capabilities, attractive station areas with sidewalk ticket vending machines, real-time vehicle tracking, signal manipulation, and attractive streetscape amenities and convenient pedestrian access (crossings and walkways into surrounding areas) should be integrated into the new roadway construction.

Retrofit Existing Arterials: Existing arterials connecting to significant destinations can be retrofitted with attractive stations, signal priority and queue jump facilities, bus bulbs, real time bus information, and ticket vending machines as permitted by existing rights of way.

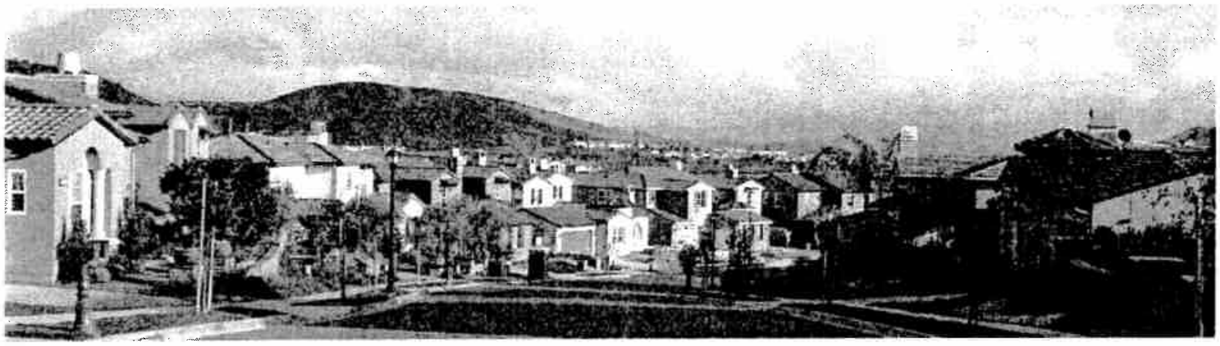
Land Use Considerations

Any discussion of transit is not complete without discussion of the service area characteristics in terms of land use and community design. Land use characteristics of most concern for transit service are often described as the 'four D's': density, diversity, design and deterrents to driving. Density refers to overall numbers of housing units or people (employees or residents) per unit of geographic area. Diversity in this case refers to the overall mix of uses and activities in an area. Design or development pattern refers to a number of factors including the connectivity of the road network, the quality and scale of the pedestrian environment (transit trips generally begin and end as pedestrian trips). The most effective deterrent to driving is costly and limited parking.

The SOCTIIP SEIR cites that existing and anticipated employment densities in south Orange County would not be adequate to sustain LRT. The lower capacity of express bus, BRT, and subscription services can operate within the moderate density geography of the south county area. While development density in the south communities is cited as 'low' in the SOCTIIP SEIR, presumably on a gross basis, on a net basis, development patterns are quite nodal, and numerous higher density 'nodes' of development

[23] Helft, Michael, "Google's Buses Help its Workers Beat the Rush," *New York Times*, March 10, 2007

(apartment and townhouses) are set within a larger single-family community. Communities also have a mix of land uses, including housing, shops, offices, and schools within its boundaries. The higher density nodes and mix of uses are well adapted to transit service.



Another advantage of transit options described above is the ability for transit services to be located within existing arterial roadways where development is established, rather than relegated to the remote alignment of the proposed toll road (which was where the LRT system was hypothesized to be developed in the All Transit Alternative). One of the primary problems with the LRT alternative was the lack of connection to destinations, more specifically it ran from nowhere to nowhere. Unlike a fixed guideway LRT system, Express Bus, BRT, subscription buses, circulators can connect to existing destinations with relative ease. This advantage makes Express Bus or BRT a much more feasible transit option.

Existing development patterns typical of the master planned communities of the south county tend to reinforce automobile usage, through the design of the street networks, the orientation of development away from transportation corridors, circuitous and/or inconvenient and unattractive pedestrian routes between housing, retail and office complexes, as well as other factors. The county should identify transit corridors in new development areas (i.e., Rancho Mission Viejo) and incorporate Transit Oriented Development principles to remove barriers to transit and pedestrian movement. All new development should emphasize the pedestrian rather than an orientation exclusively to automobiles. To the extent feasible, improvements that facilitate pedestrian and transit movement in existing developed areas should be considered on a case-by-case basis.

RESULTS

Property Impacts of AIP-R Alternative

Based on the conceptual design provided in the attached sheets, interchange designs, and cross sections, the property impacts have been estimated. Overall, the vast majority of the improvements of the AIP-R alternative can be completed within the current I-5 right of way. Assessed values from Orange County for the year 2005 were the most recent available, and may require some adjustment. The following table summarizes the results.

Table 3: Potential Property Takings for the AIP-R Alternative by Community

	Commercial		Residential	
	Acquisition Cost	Properties	Acquisition Cost	Properties
Lake Forest	$ 1,200,000	1		
Laguna Hills	$ 11,730,000	3		
Mission Viejo	$ 3,230,000	2		
San Clemente	$ 4,480,000	10	$ 2,150,000	11
San Juan Capistrano	$ 3,240,000	4		
Total	$ 24,480,000	20	$ 2,150,000	11
Grand Total Cost	$ 26,630,000			

The following table compares to the costs of the AIP-DEIS alternative.

Table 4: Comparison of Property Takings in AIP-R with AIP-SEIR

Type of Property	AIP- SEIR Properties	AIP-R Properties	AIP-SEIR Acquisition Cost	AIP-R Acquisition Cost	AIP-R as percent of AIP-SEIR Cost
Residential	898	11	$ 583,700,000	$ 2,150,000	0.4%
Commercial	339	20	$ 466,125,000	$ 24,480,000	5.3%
Total	1,237	31	$ 1,049,825,000	$ 26,630,000	2.5%

The AIP-R impacts are only a tiny fraction of that reported for the AIP alternative in the DEIS/SEIR. The design refinements proposed in this report comply with applicable guidelines and standards, and invalidate the conclusion reached in the SEIR that the AIP alternative would result in unacceptable high property impacts.

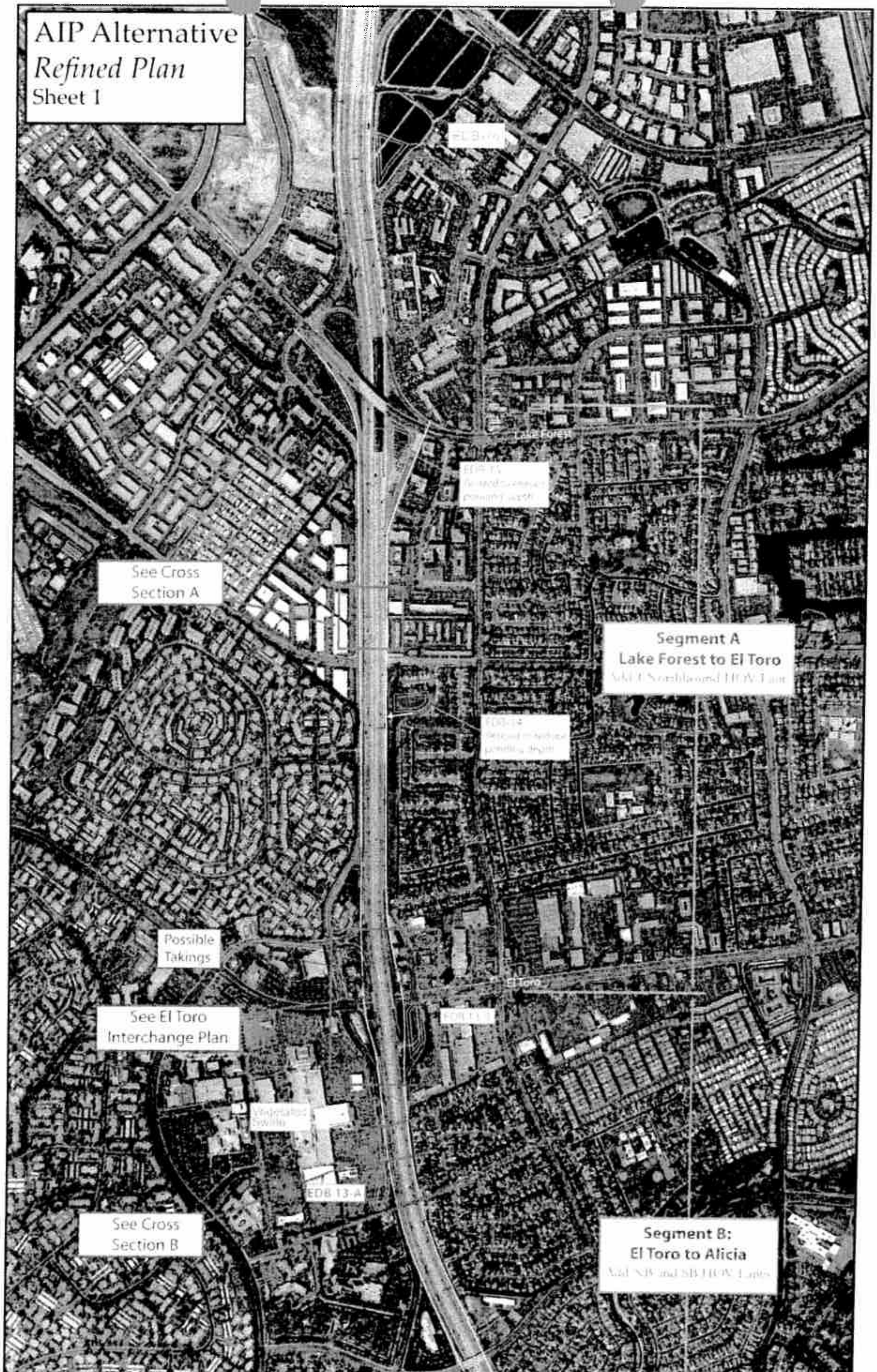
SUMMARY AND CONCLUSIONS

- The AIP-Refined (AIP-R) alternative results in extremely limited displacement when carefully designed to avoid private property. This negates the primary reason for the rejection of the AIP alternative in the SEIR, which was the purportedly severe impacts to private property. The AIP-R is a reasonable, practicable, prudent and feasible alternative to the Foothill South Toll Road proposed by the TCA.
- Based on SEIR data, the AIP-R alternative outperforms the toll road in relieving I-5 congestion and performs virtually as well as the TCA tollroad extension of Route 241 in terms of regional travel time savings and other typical traffic performance measures.
- For all of the alternatives, travel time improvements over existing conditions are negligible from a productivity/economic development point of view, amounting to only a small fraction of 1%. In addition, with respect to the toll road, virtually all travel time improvements would benefit the occupants of future developments on the Rancho Mission Viejo property and other undeveloped land.

Attachments

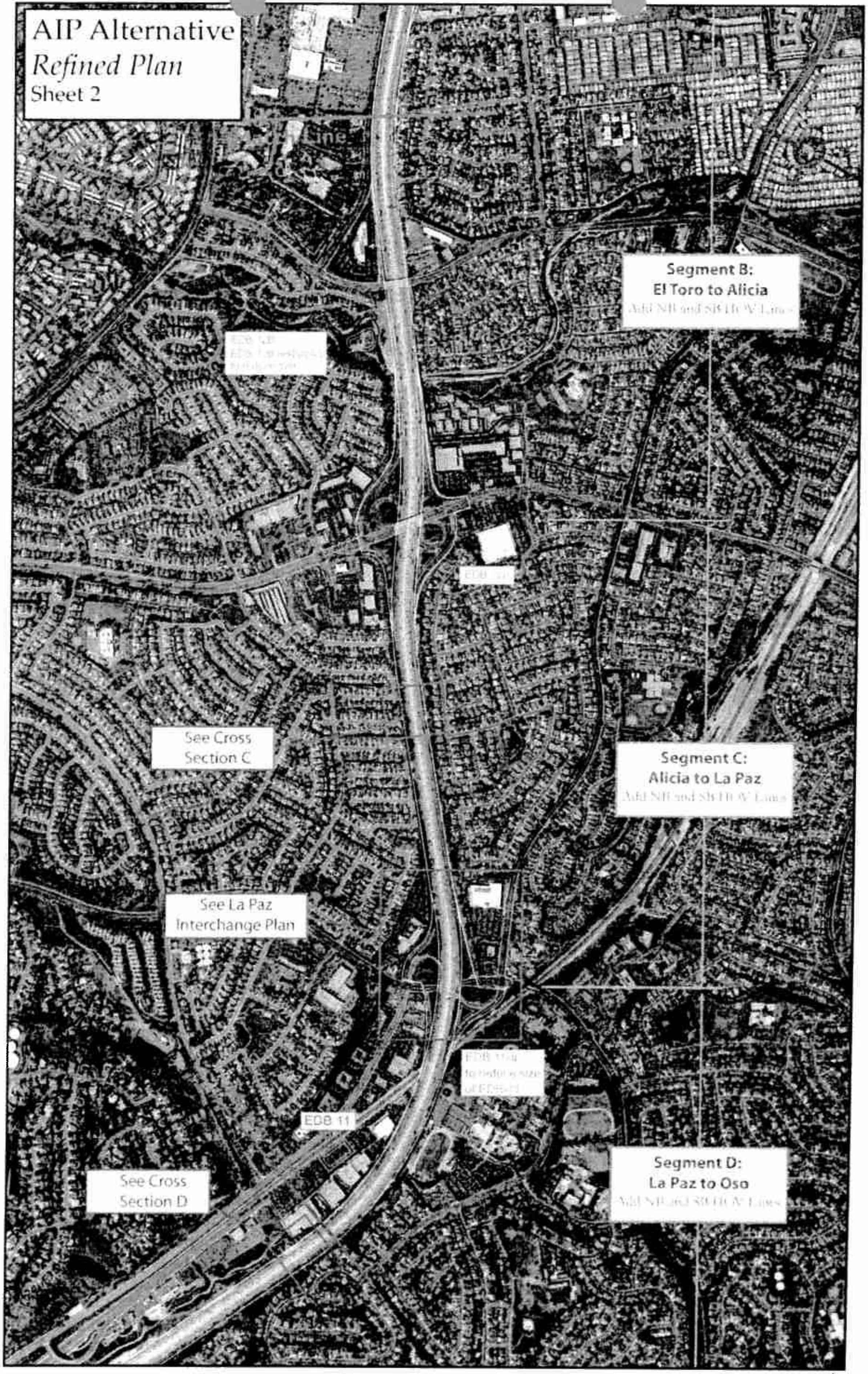
- Project Area Maps
- Cross Sections
- Interchange Area Concepts
- List of Preparers

smart mobility



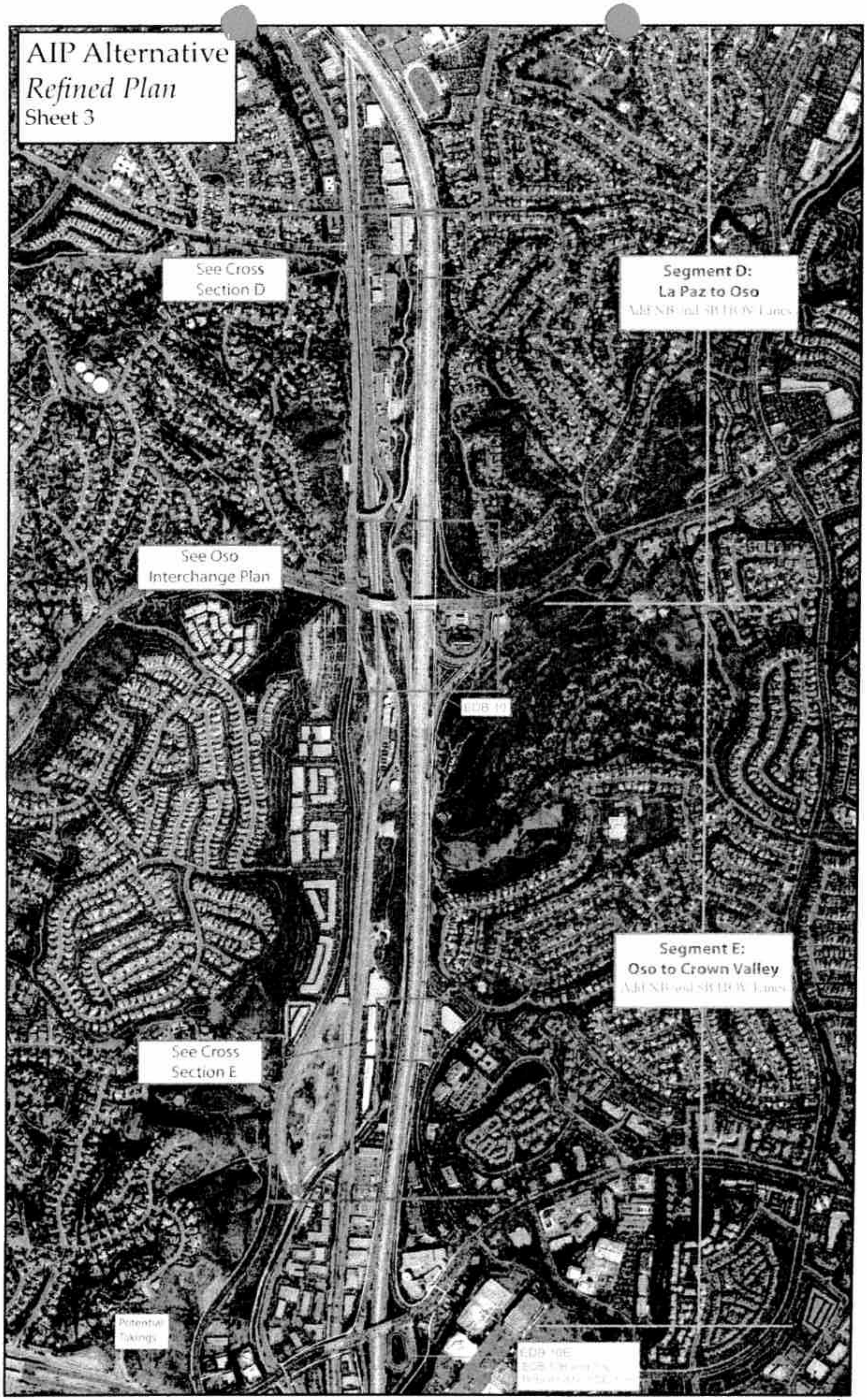
2,500 feet

smart mobility



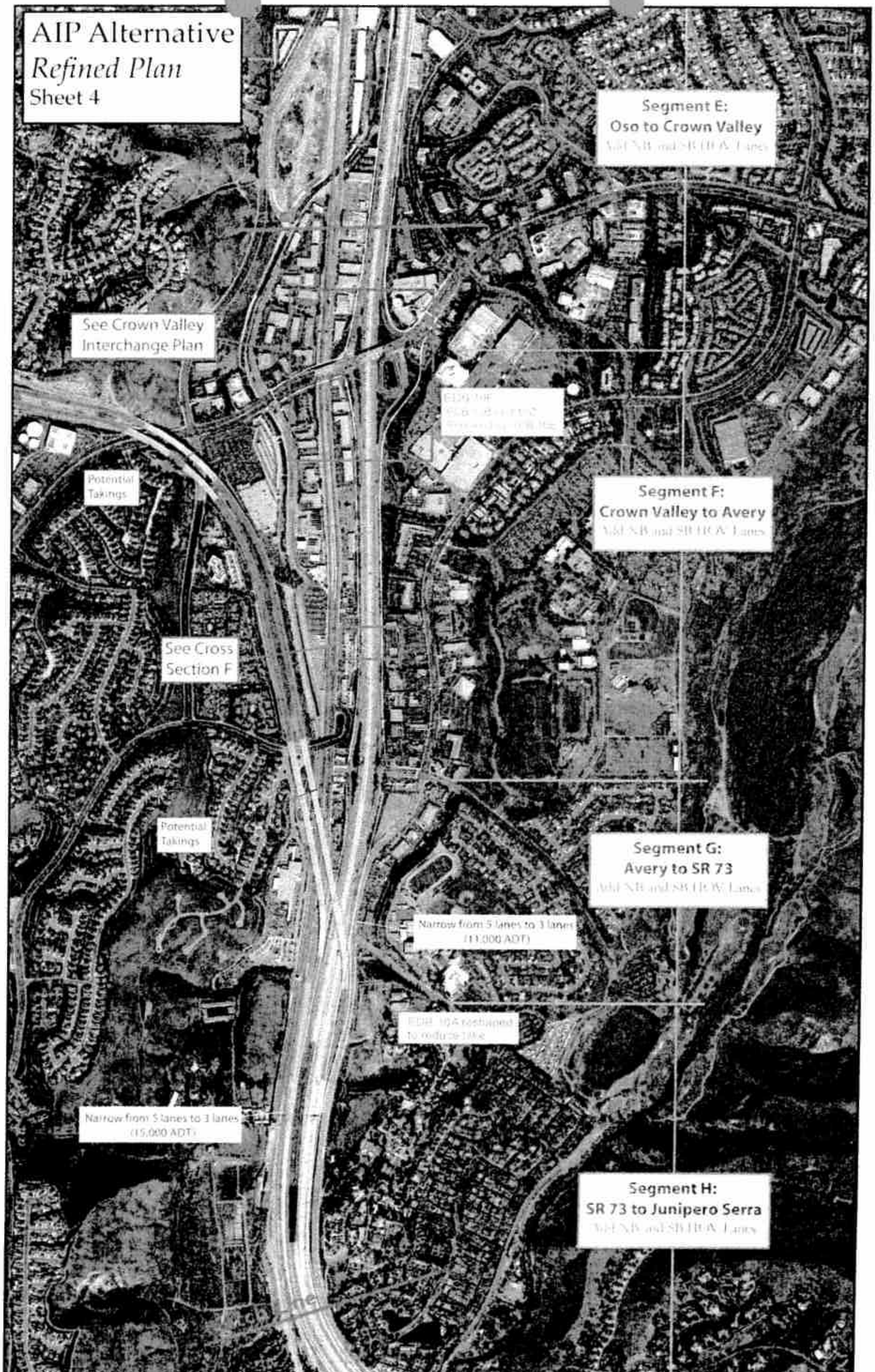
2,500 feet

smart mobility



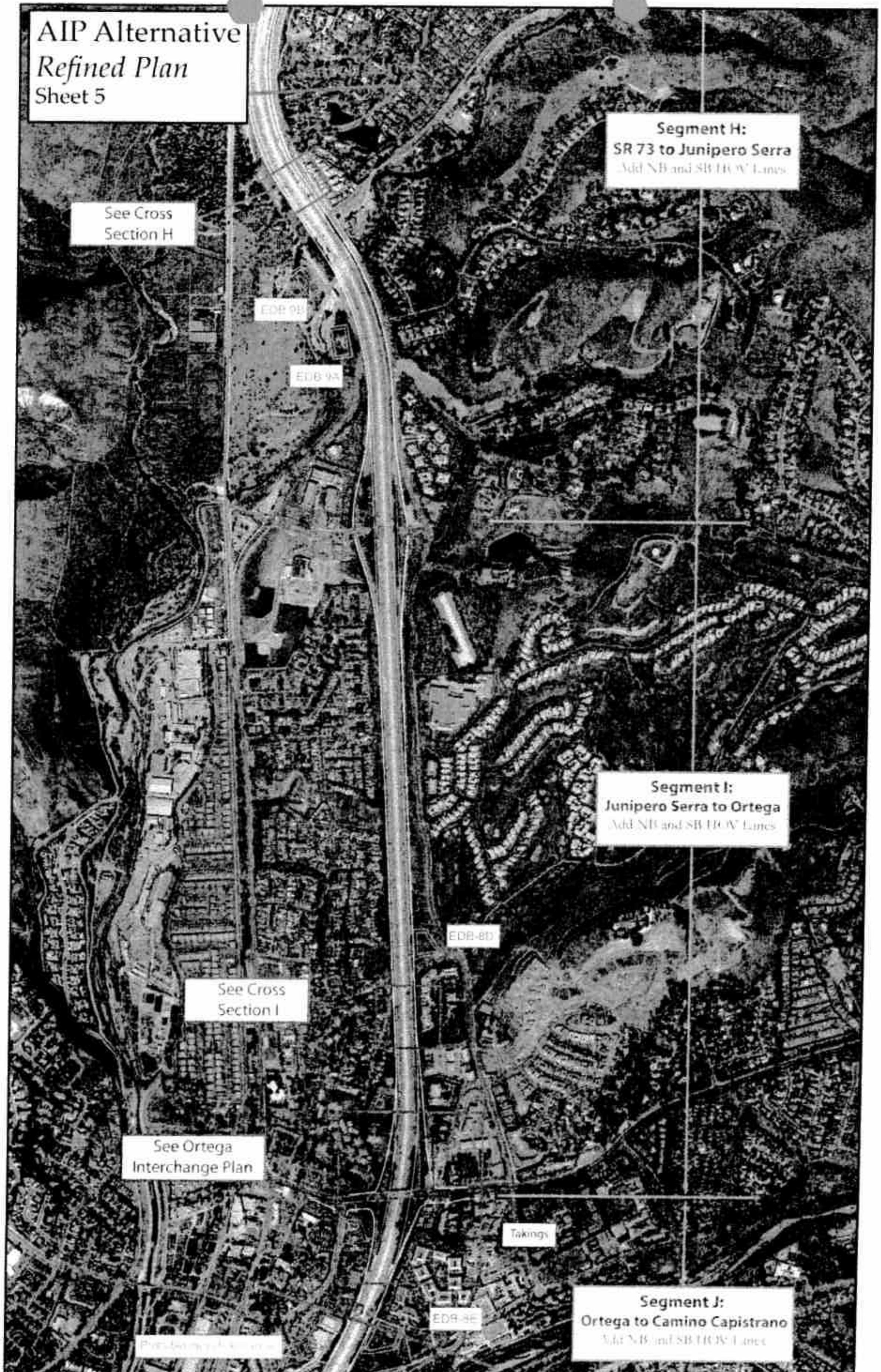
2,500 feet

smart mobility



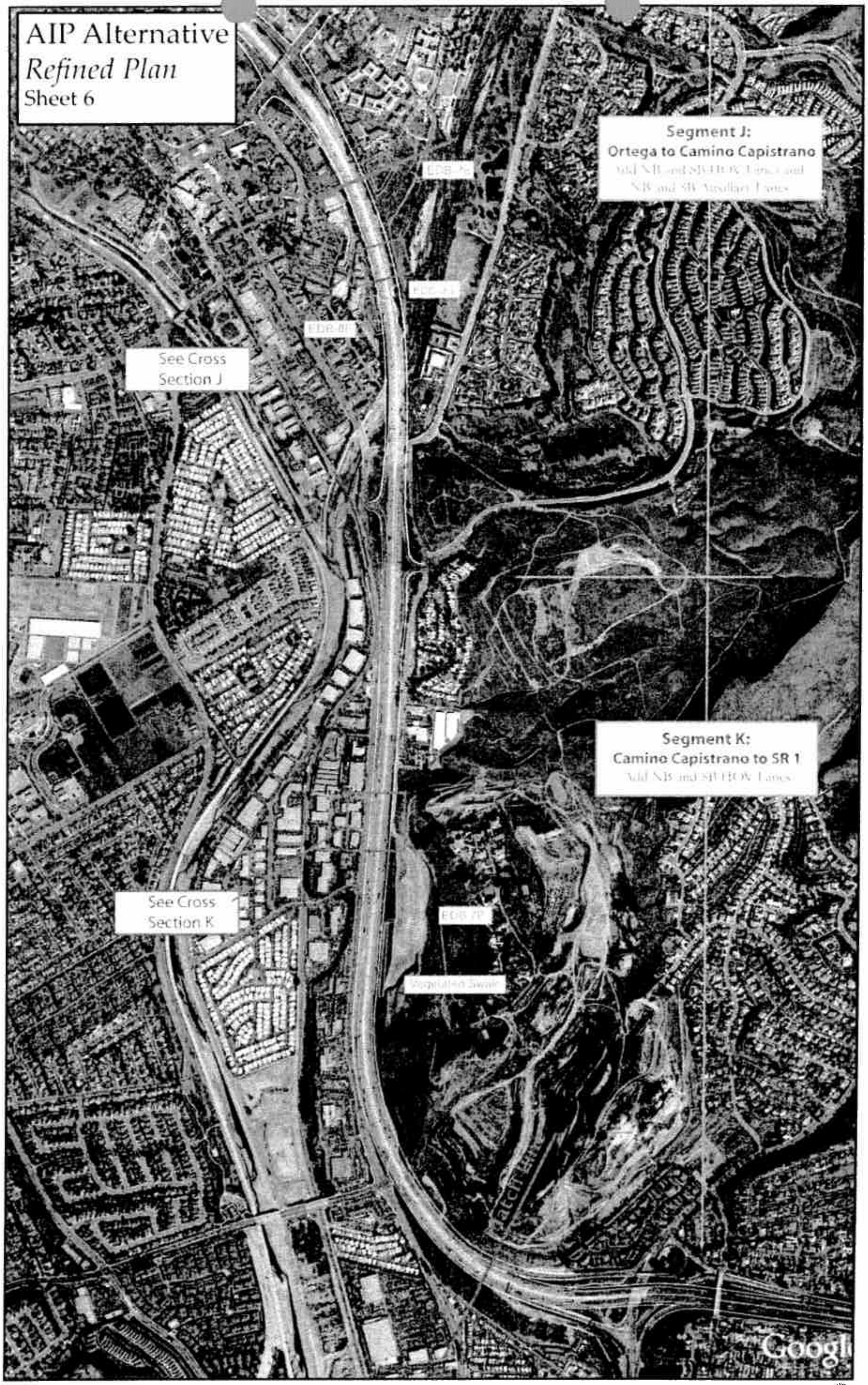
2,500 feet

smart mobility



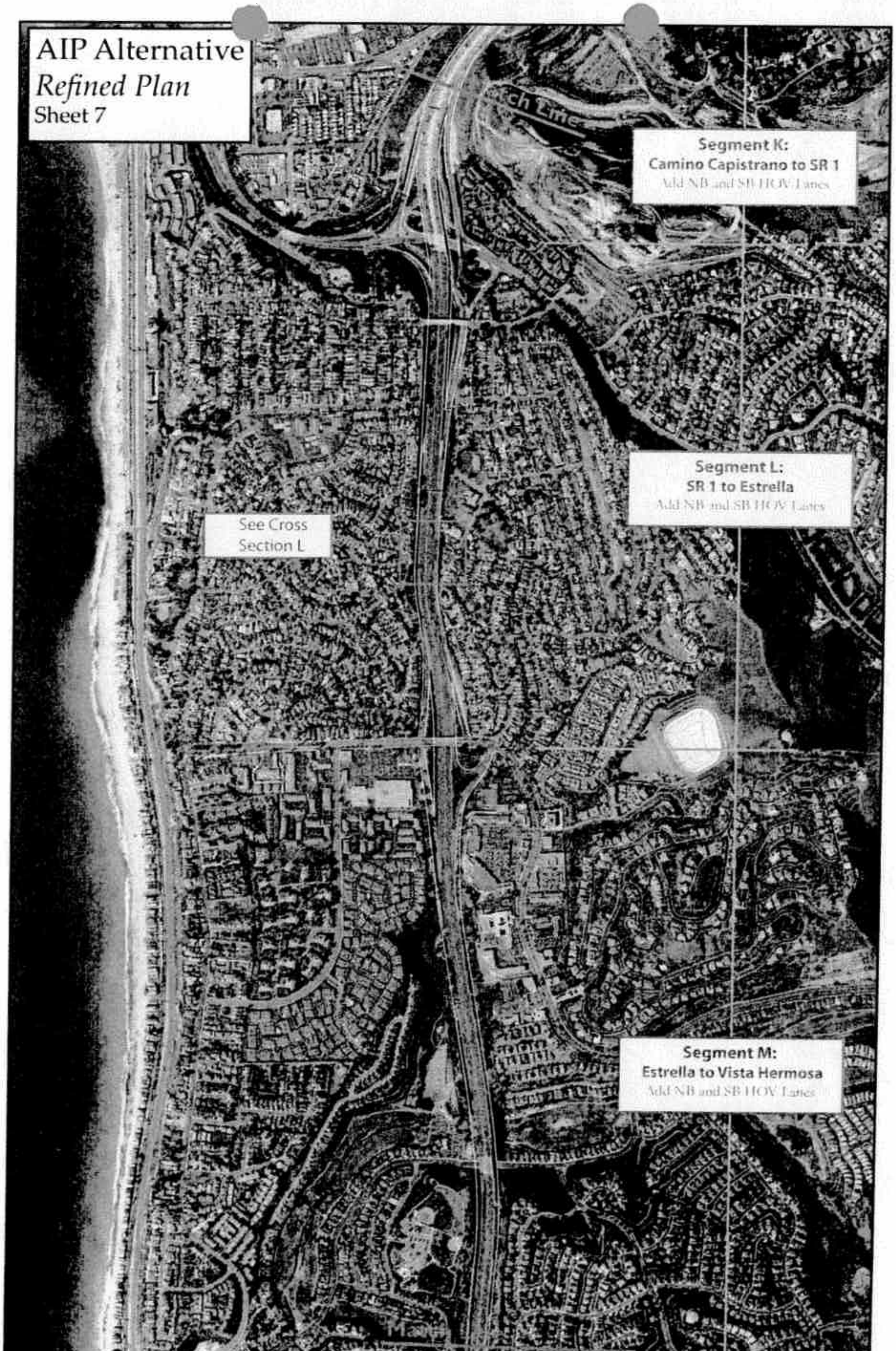
2,500 feet

smart mobility



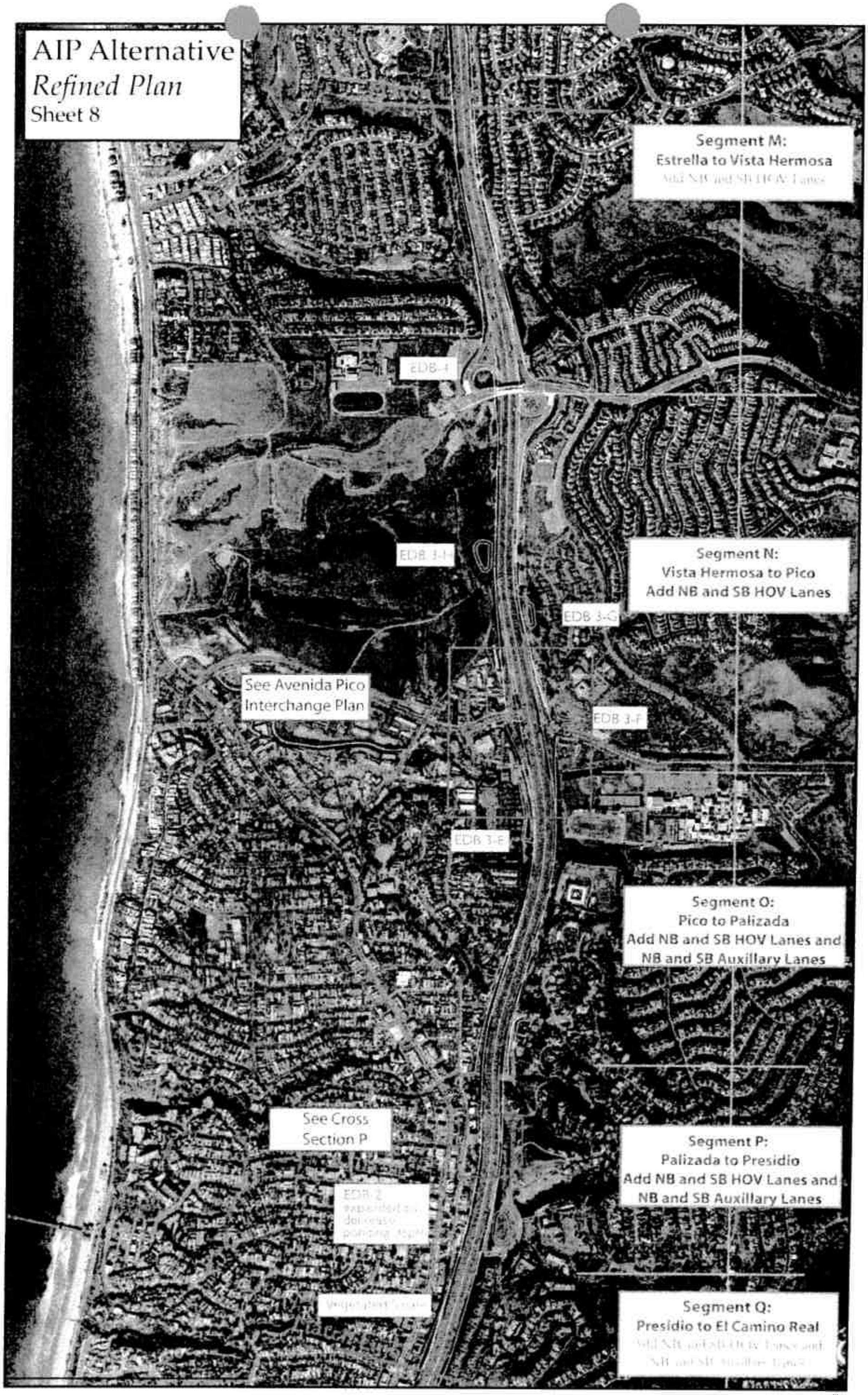
2,500 feet

smart mobility



2,500 feet

smart mobility



2,500 feet

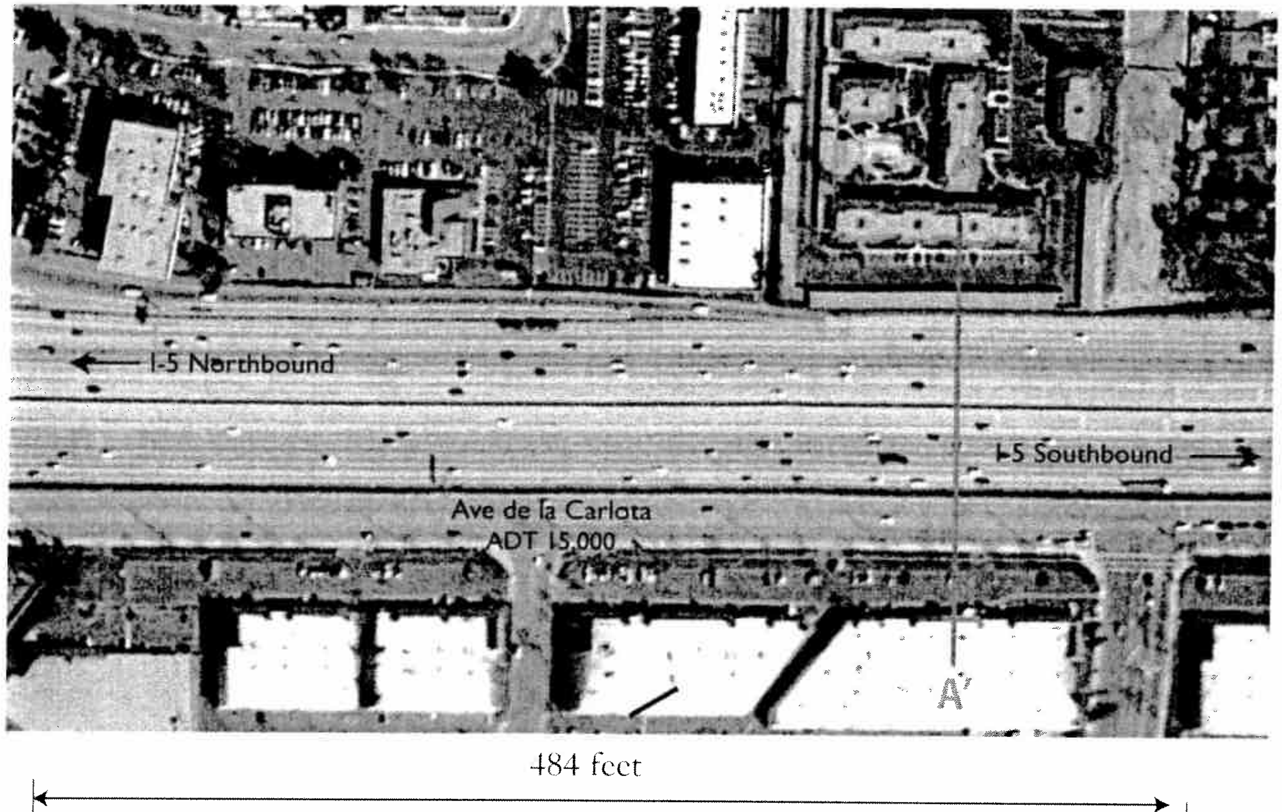
smart mobility


AIP Alternative
Refined Plan
Sheet 9
Segment Q:
Presidio to El Camino Real
See El Camino
Interchange Plan
Segment R:
El Camino Real to Califia
Segment S:
Califia to Cristianos
See Cross
Section 5
EDB-18 Revised

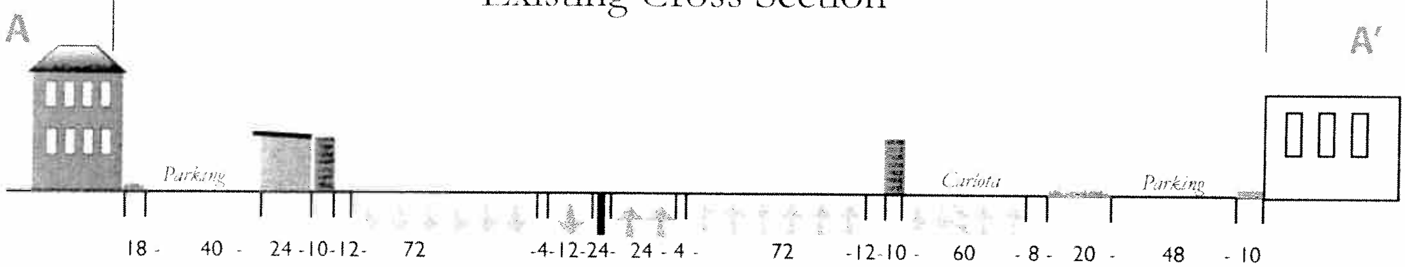
2,500 feet

Cross Section A

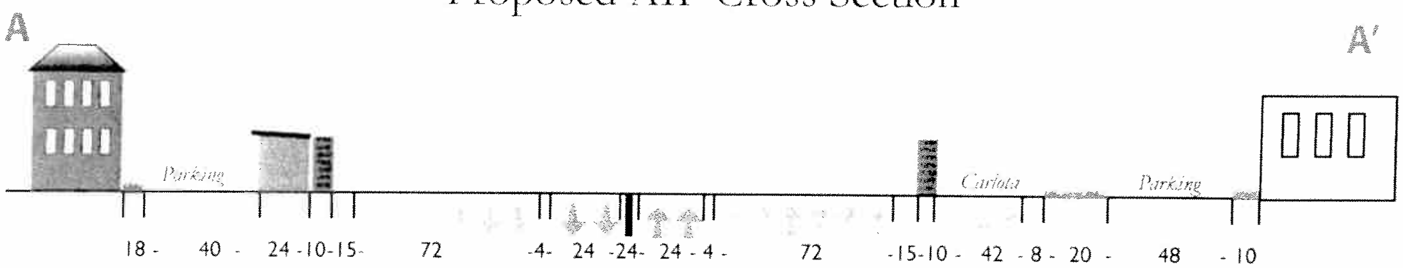
Laguna Hills, North of El Toro Interchange



Existing Cross Section

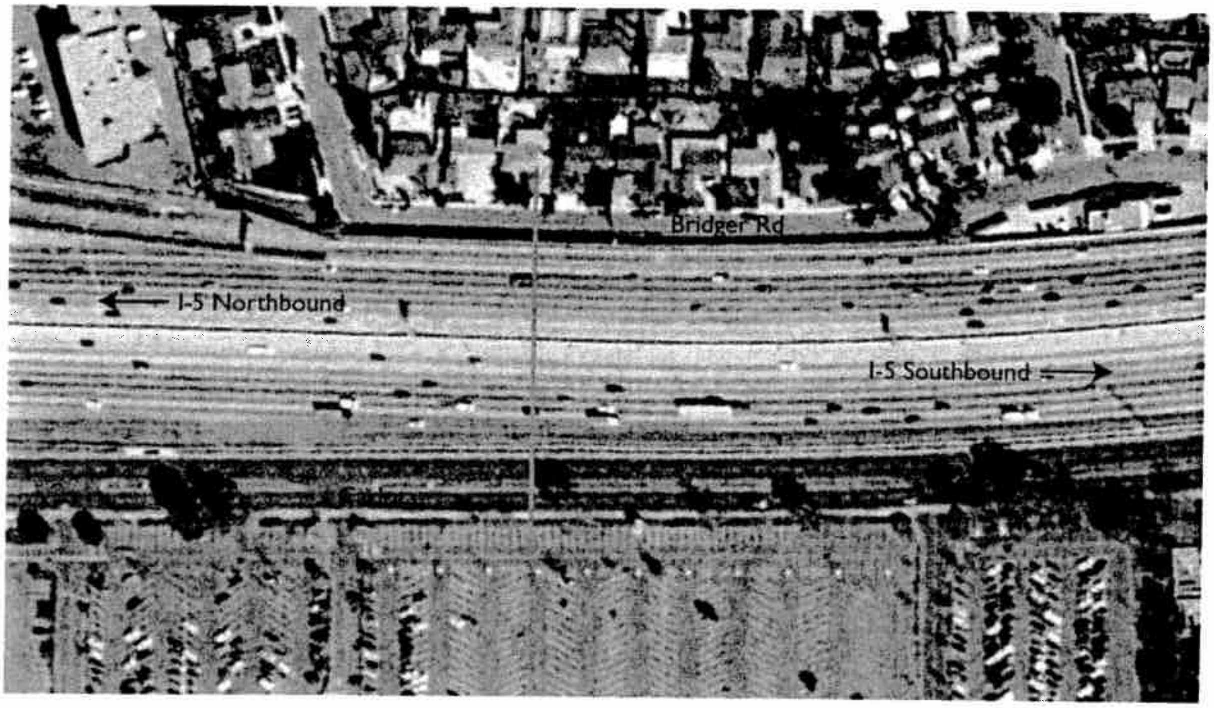


Proposed AIP Cross Section



Cross Section B

Laguna Hills, South of El Toro Interchange

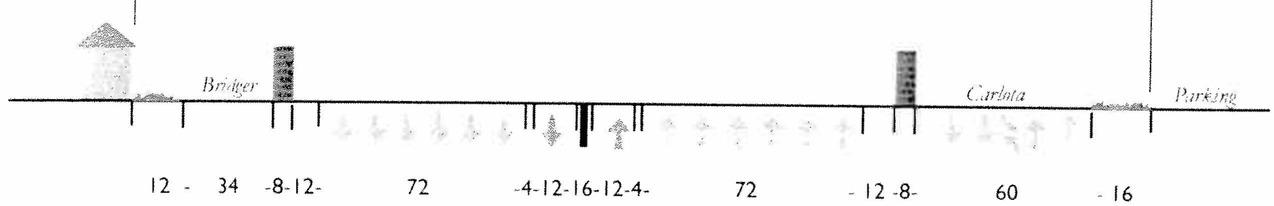


354 feet

Existing Cross Section

B

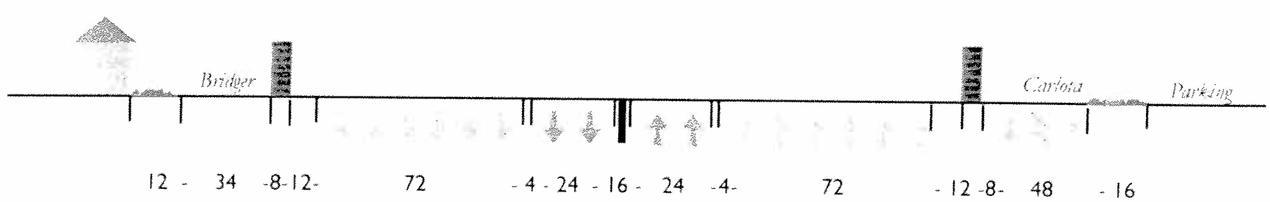
B′



Proposed AIP Cross Section

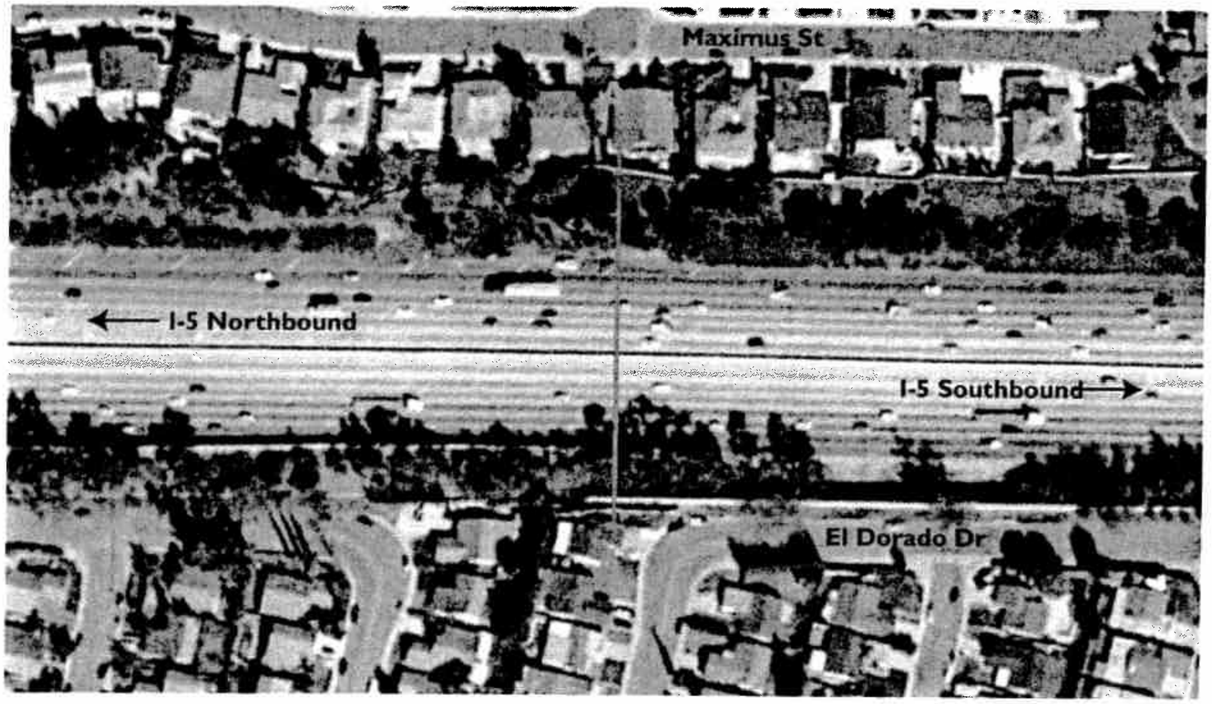
B

B′

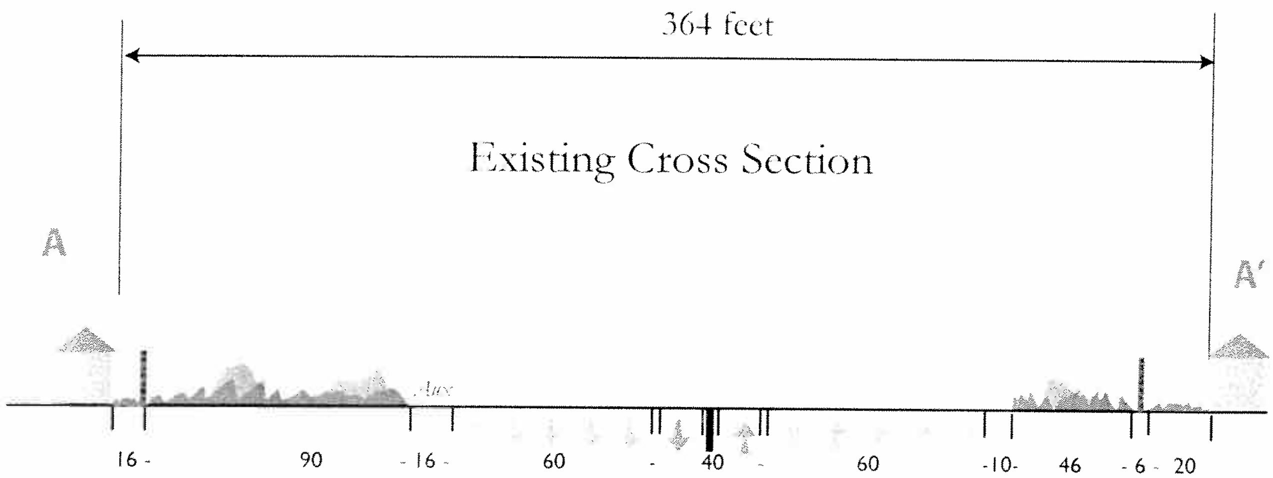


Cross Section C

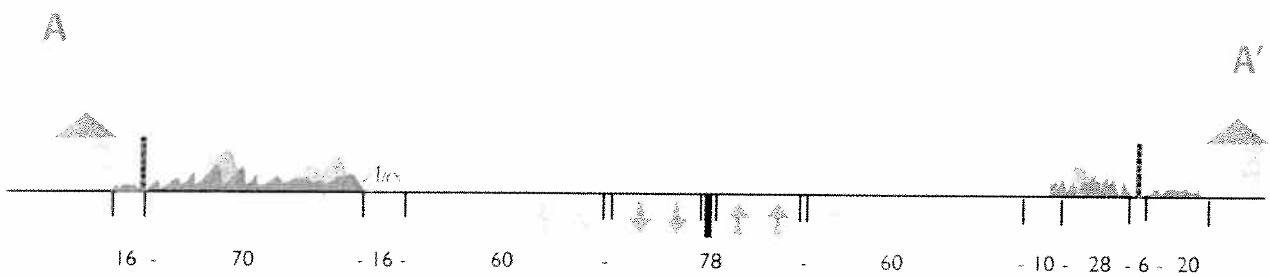
Laguna Hills



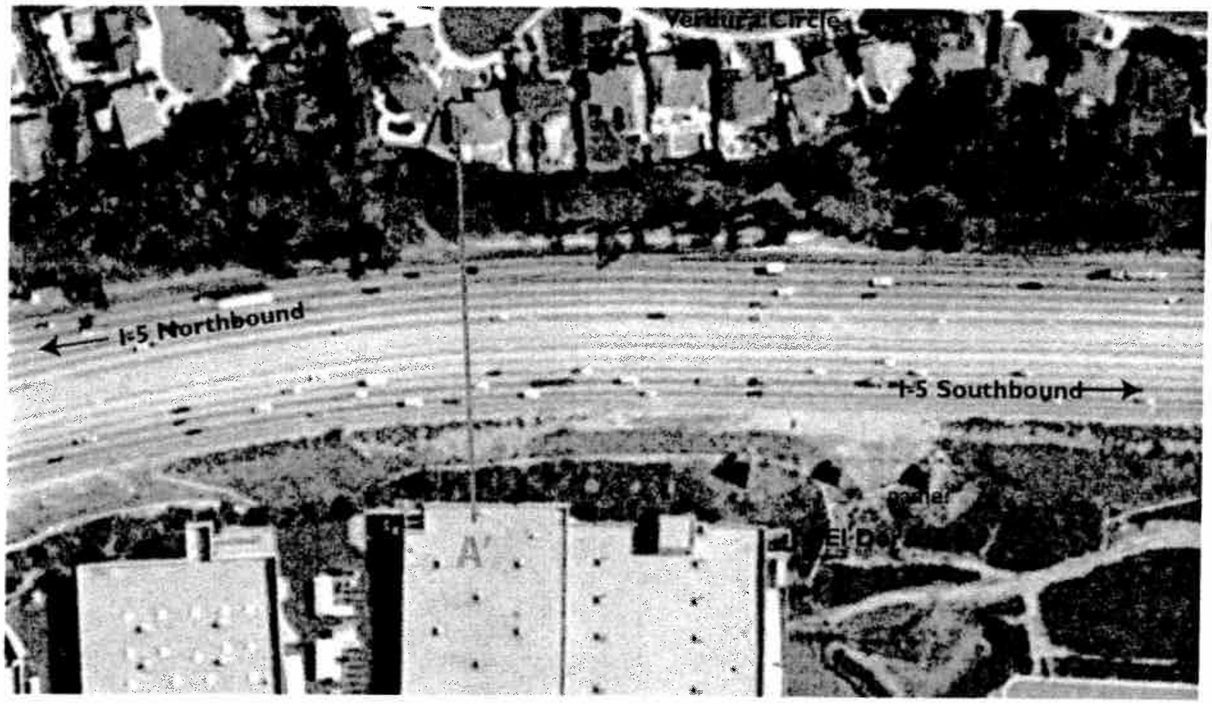
Existing Cross Section



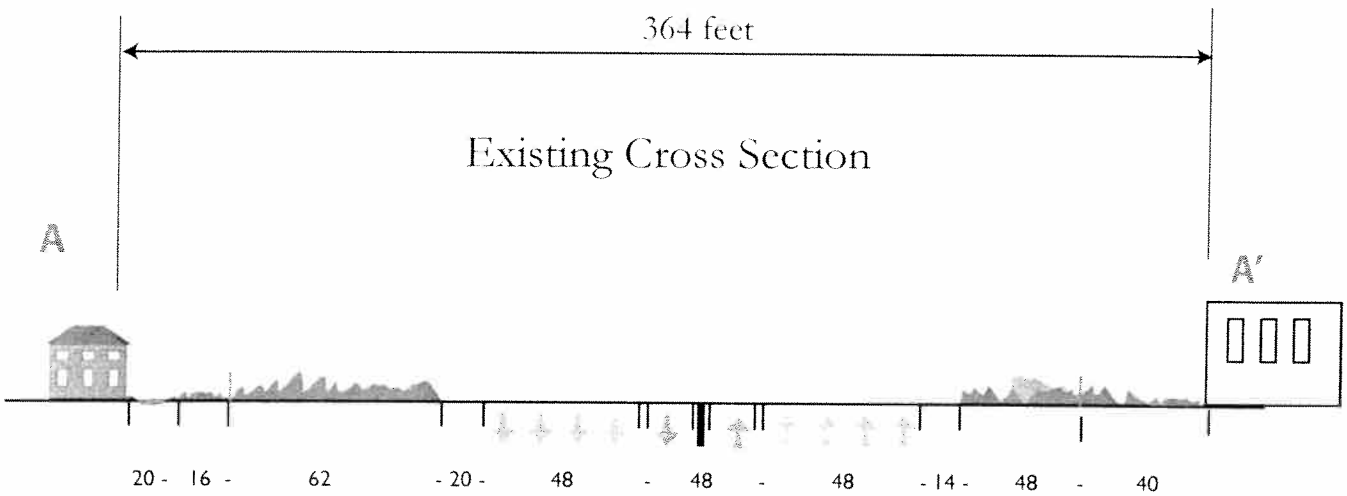
Proposed AIP Cross Section



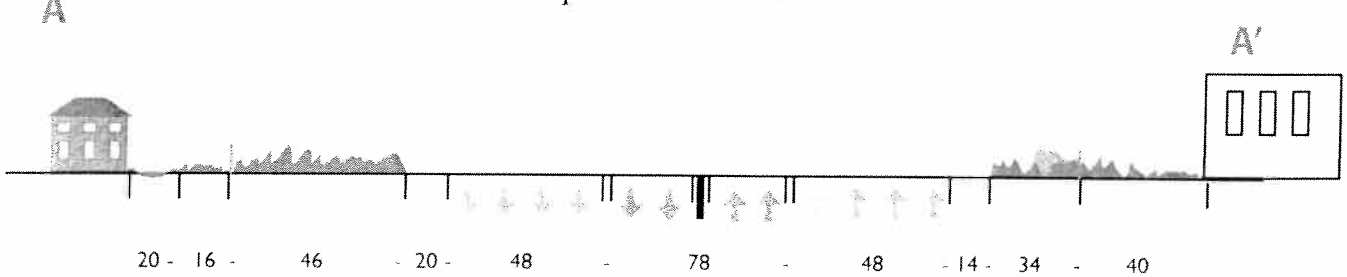
Cross Section D
Mission Viejo



Existing Cross Section

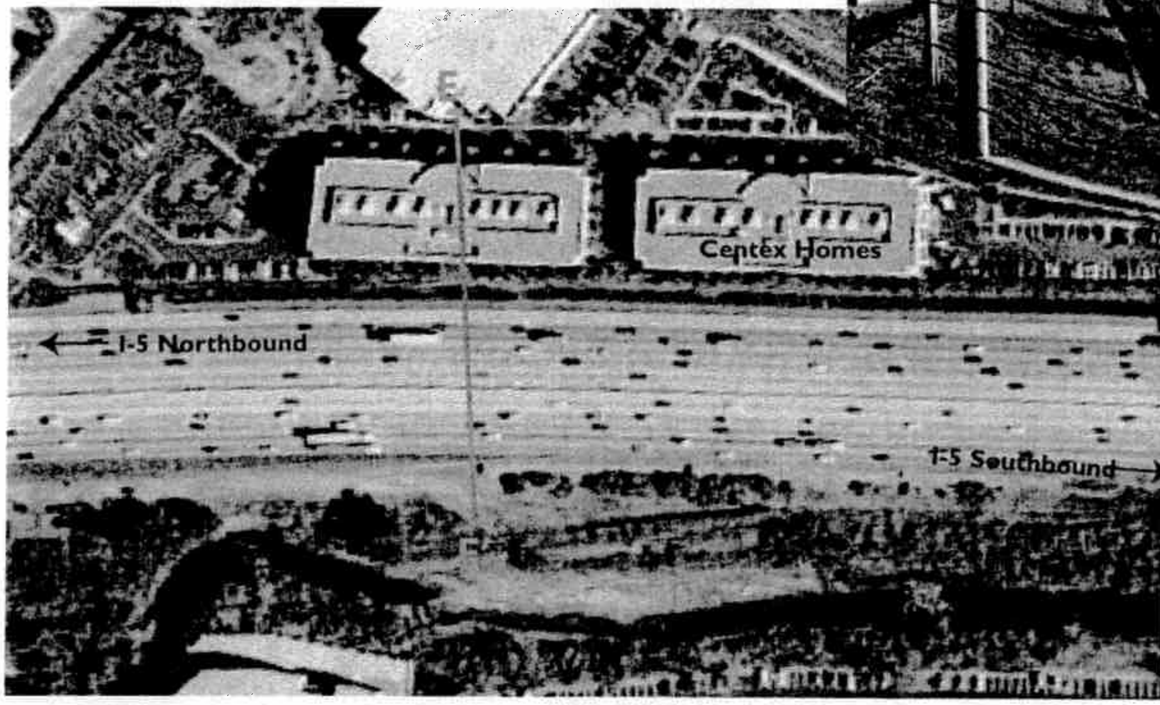


Proposed AIP Cross Section



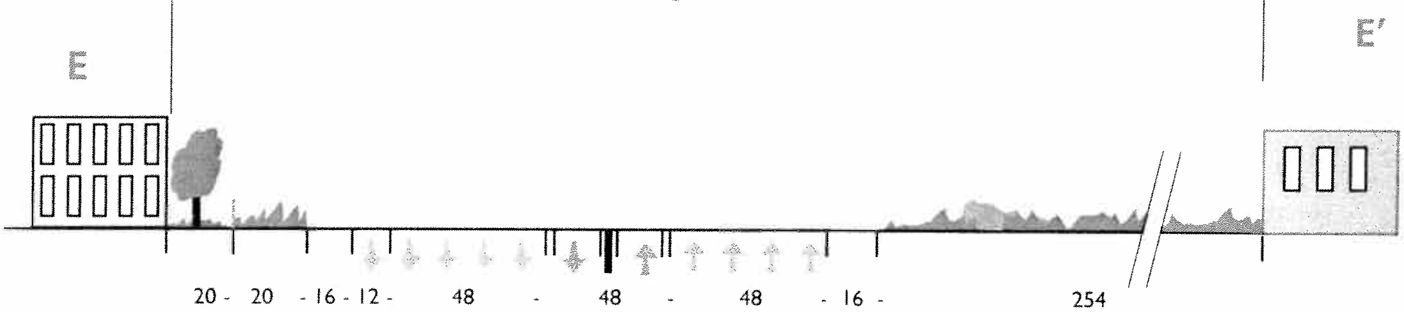
Cross Section E

Mission Viejo

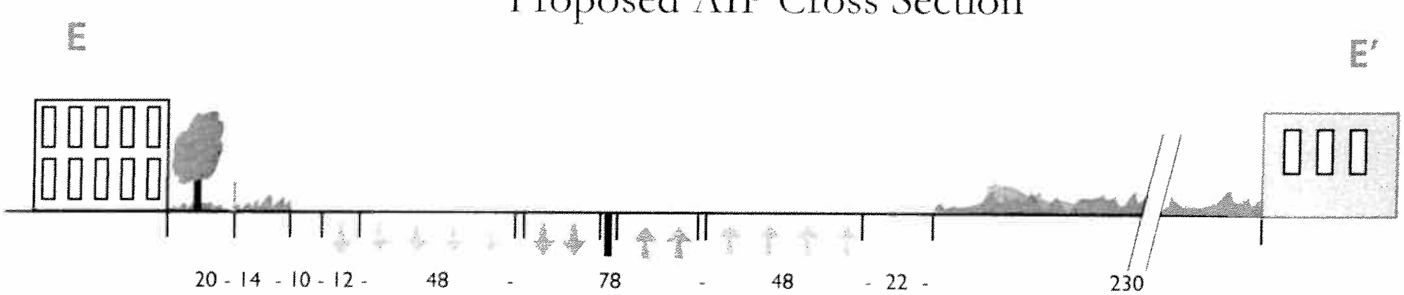


482 feet

Existing Cross Section

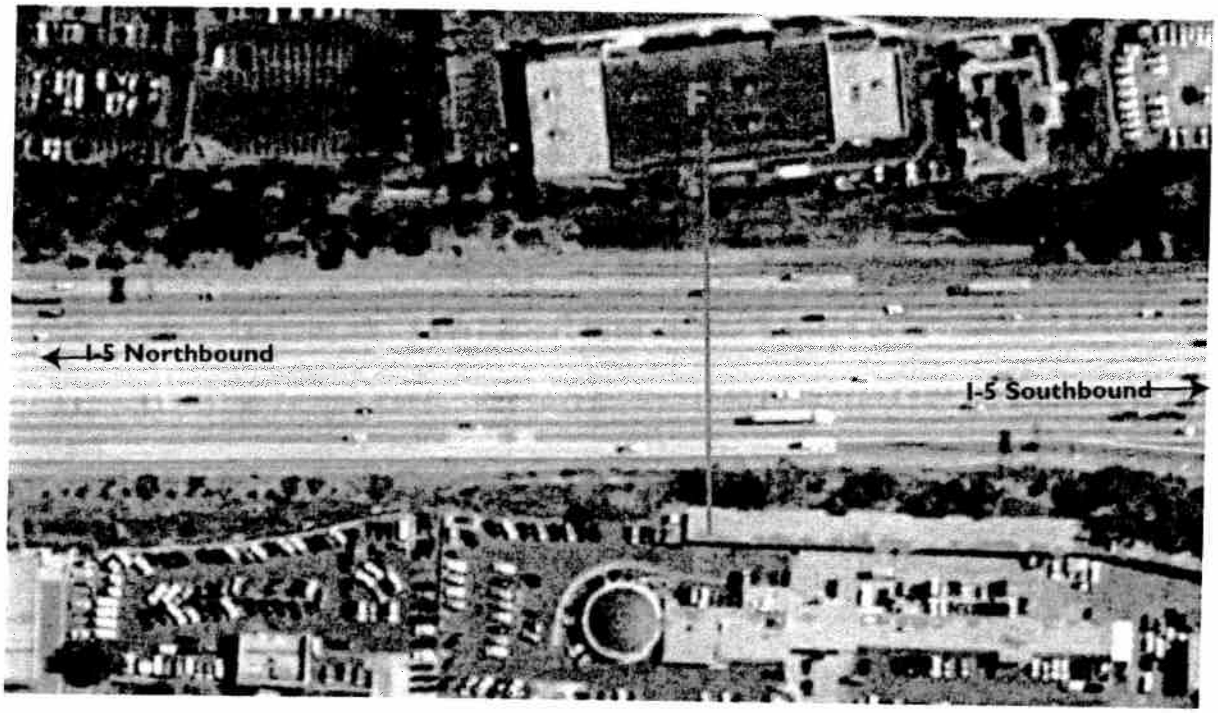


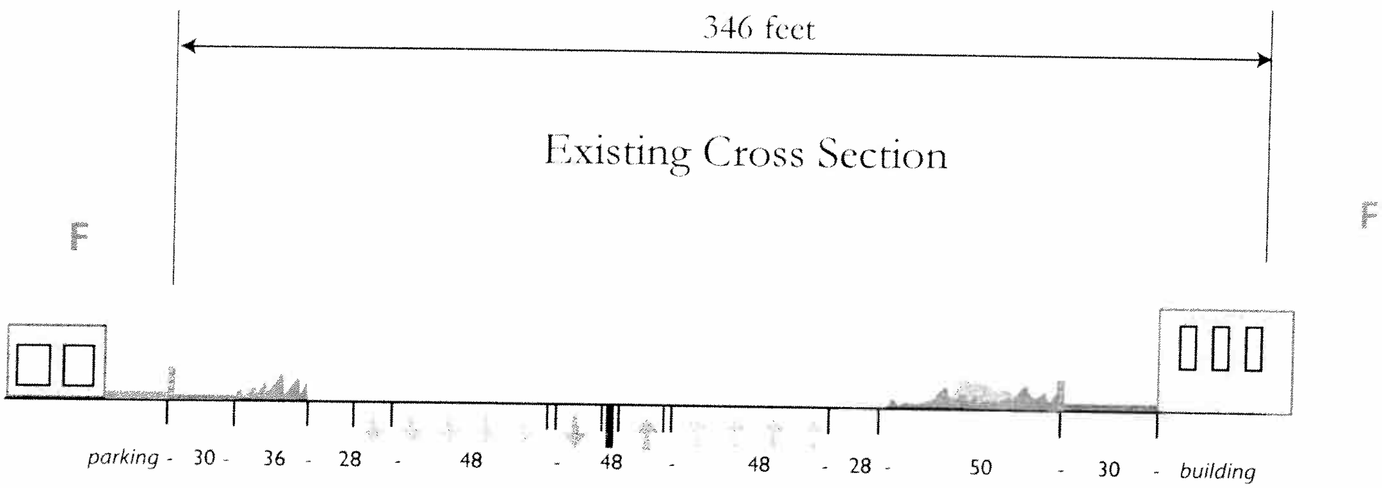
Proposed AIP Cross Section

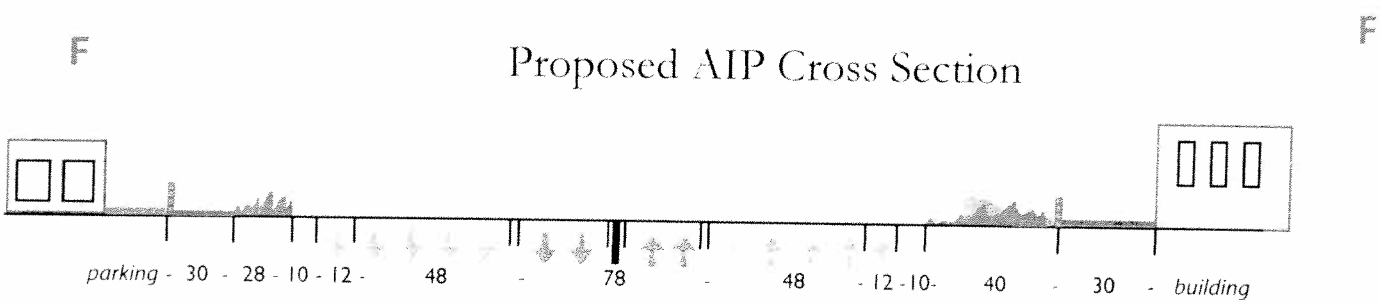


Cross Section F

Mission Viejo

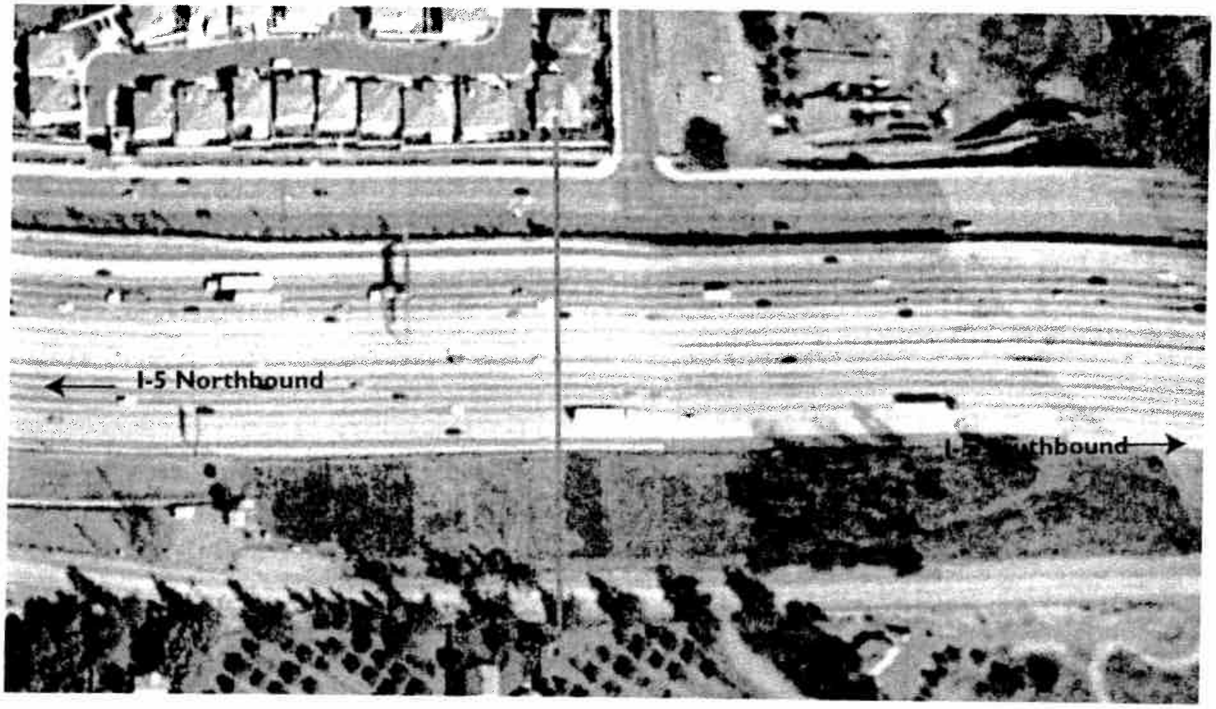




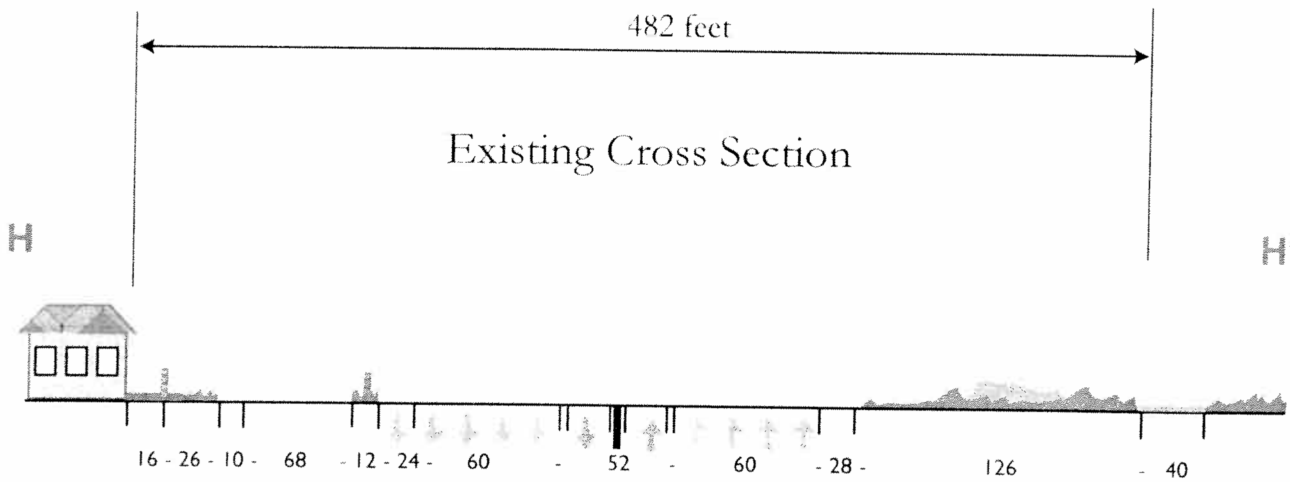


Cross Section H

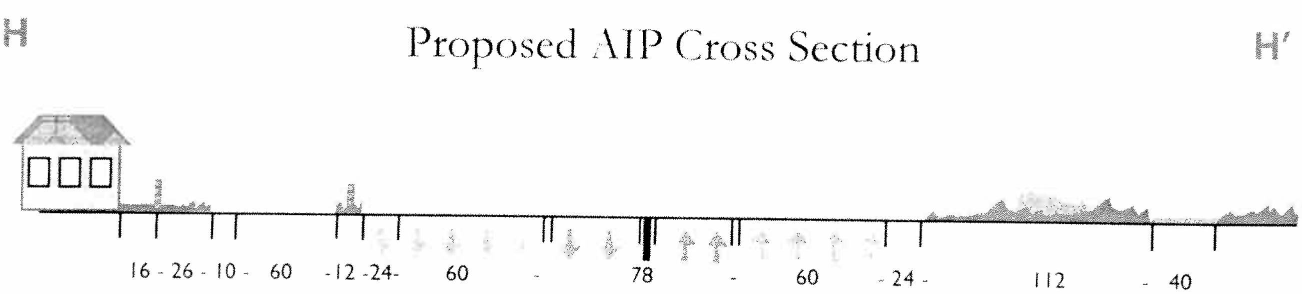
Mission Viejo



Existing Cross Section

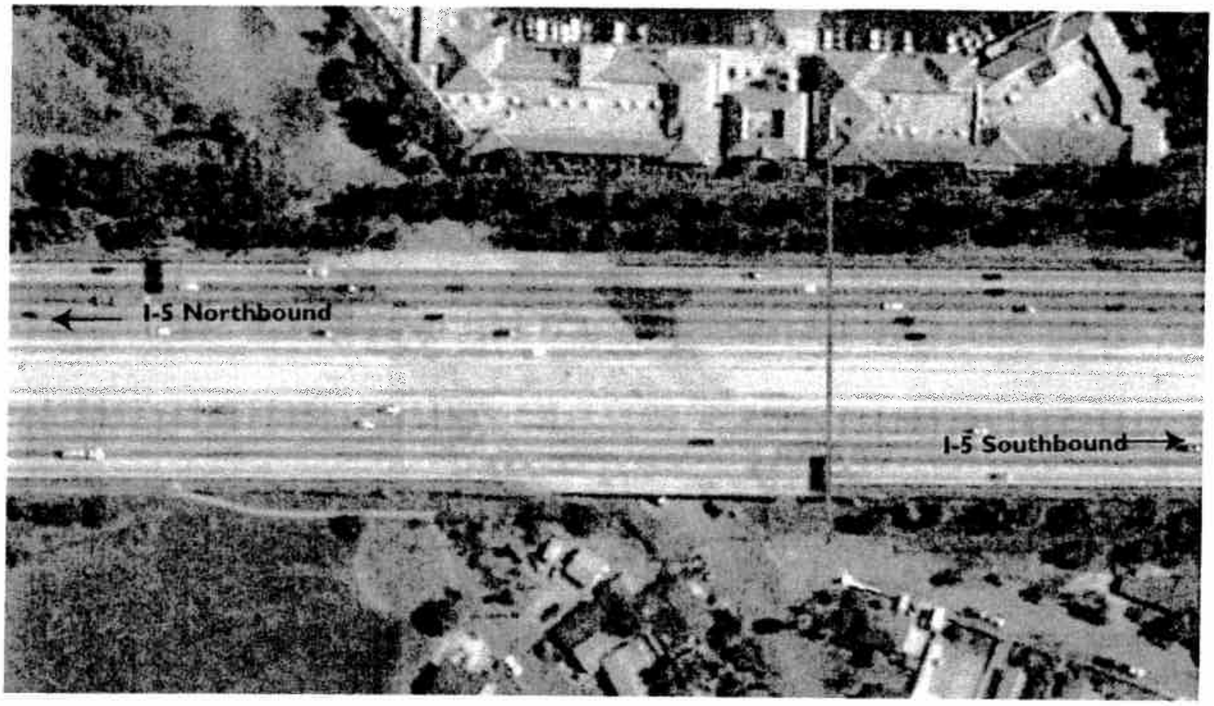


Proposed AIP Cross Section

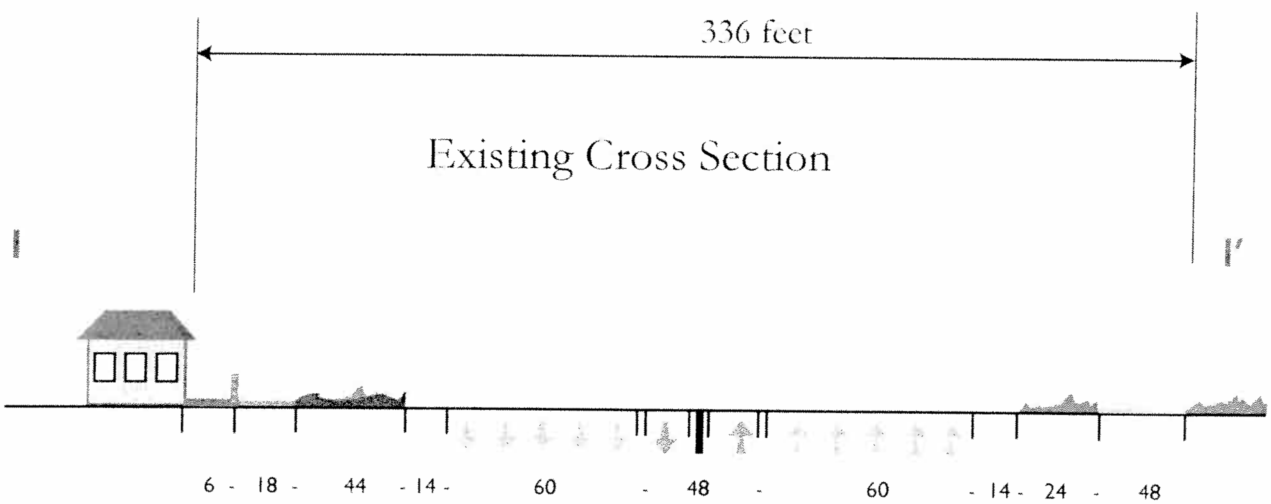


Cross Section I

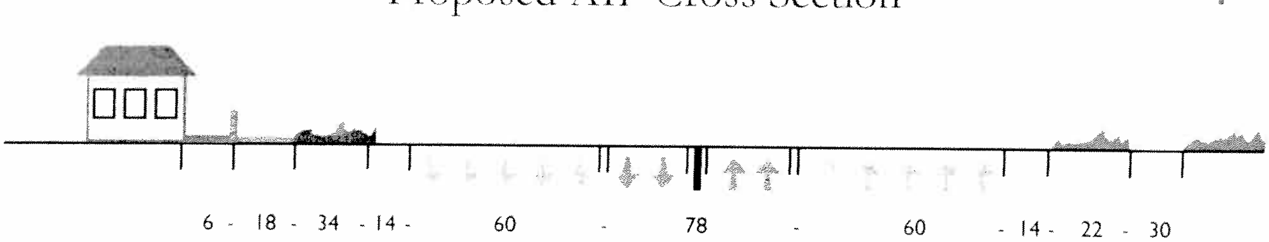
San Juan Capistrano



Existing Cross Section

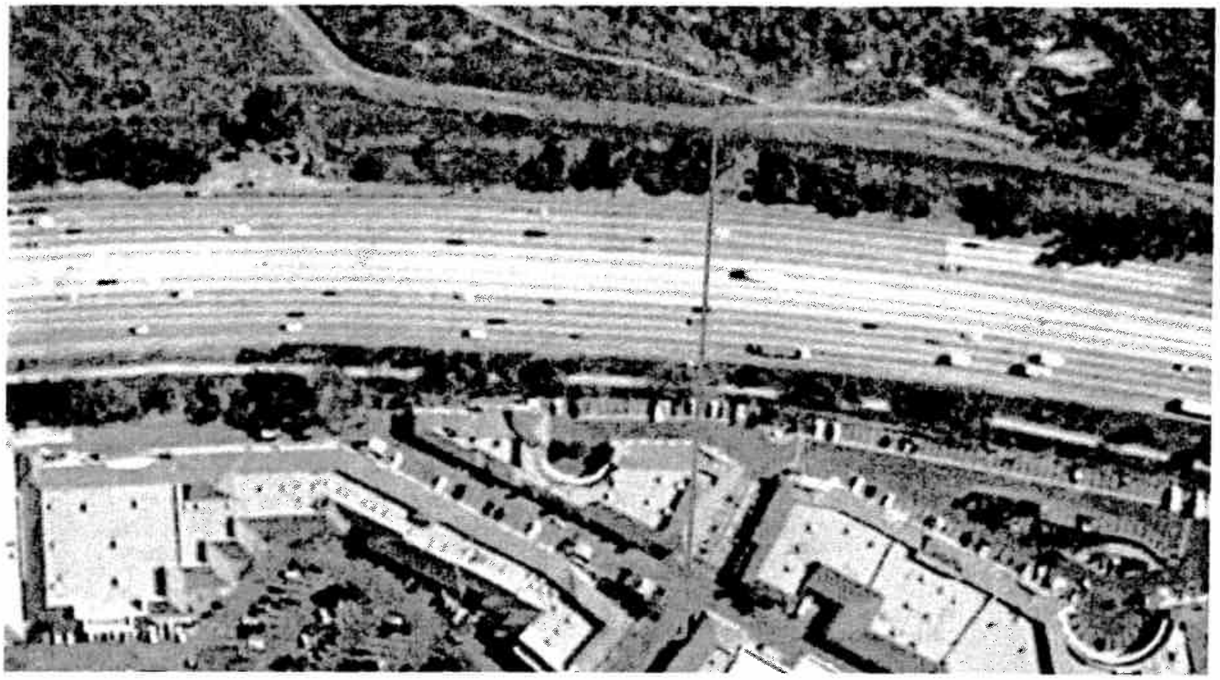


Proposed AIP Cross Section

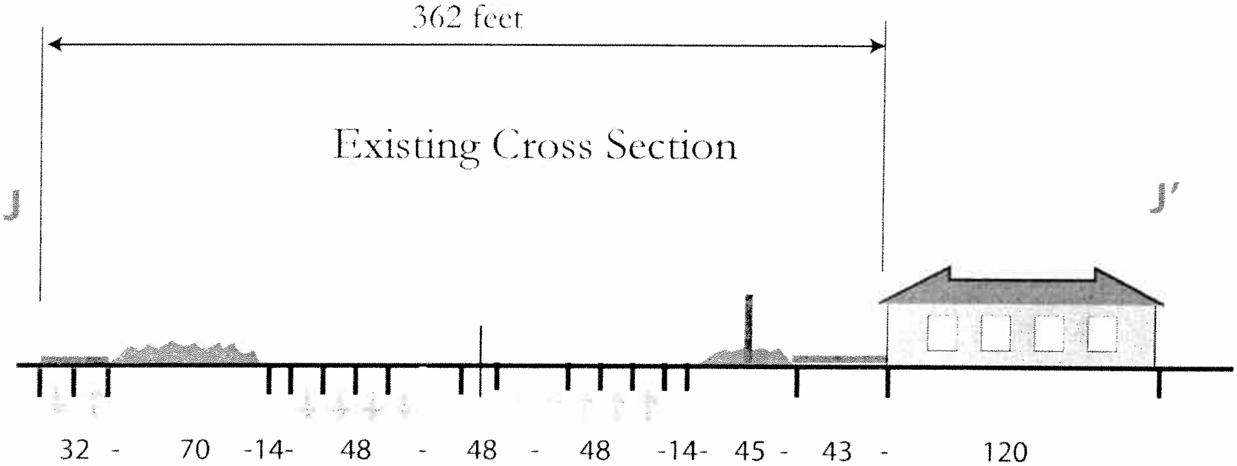


Cross Section J

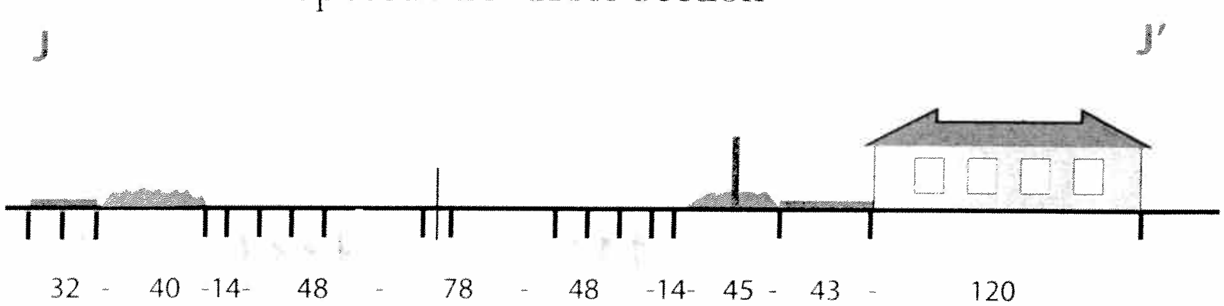
San Juan Capistrano



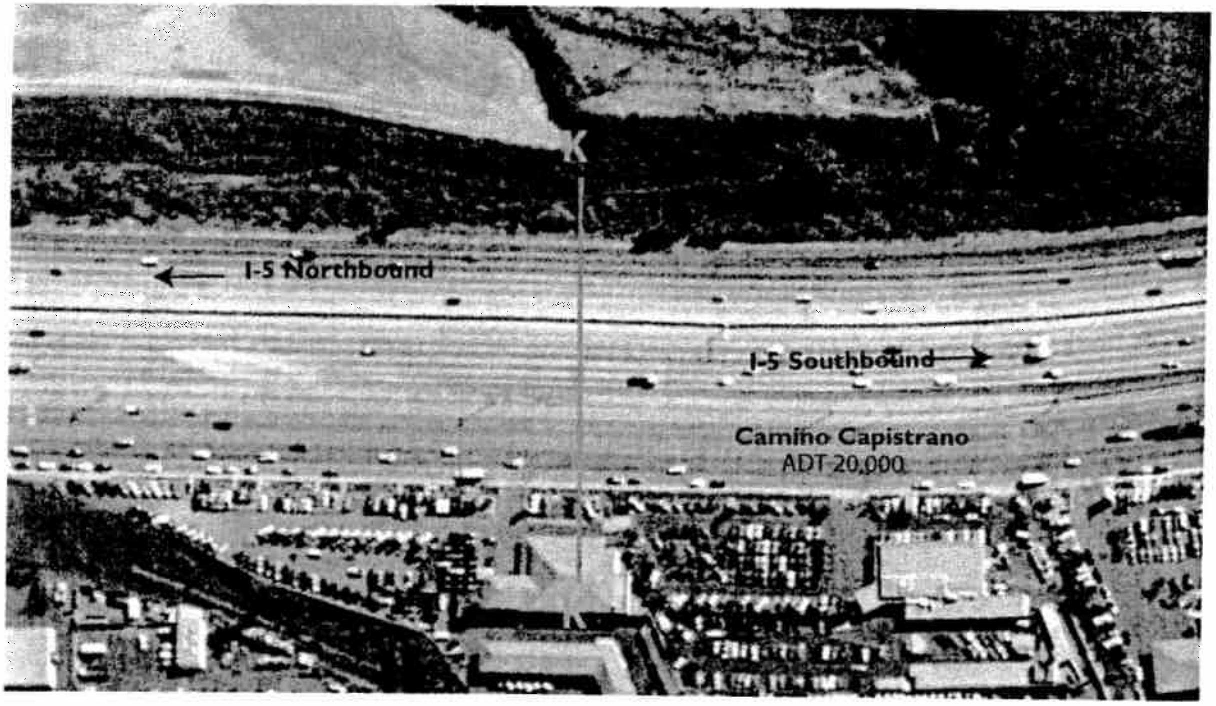
Existing Cross Section



Proposed AIP Cross Section

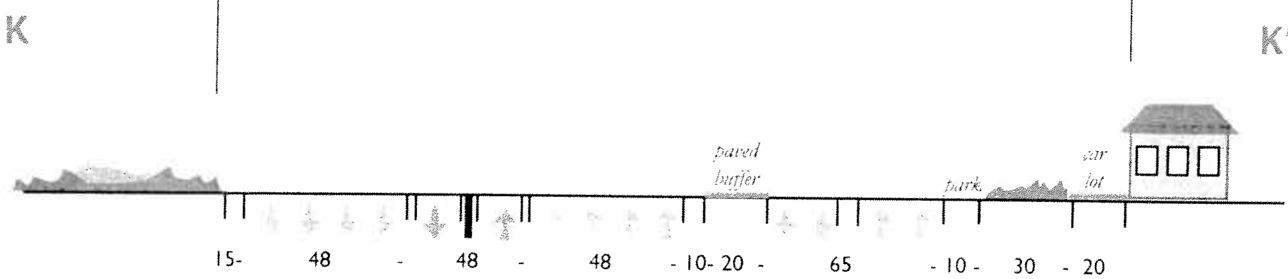


Cross Section K
San Juan Capistrano

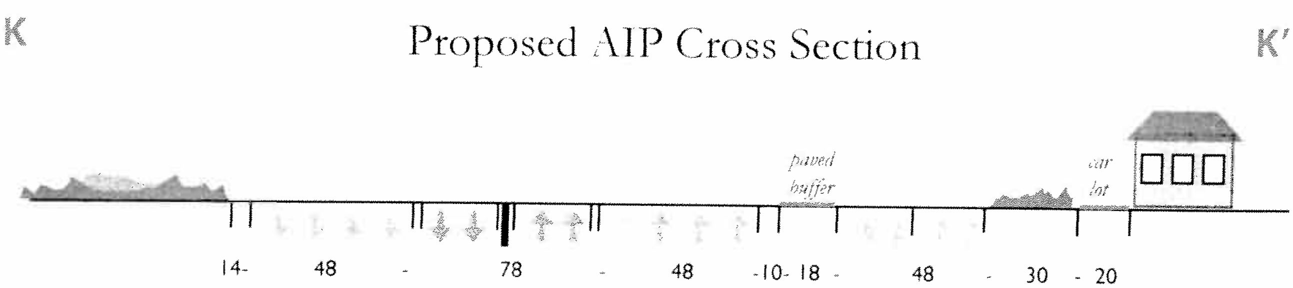


314 feet

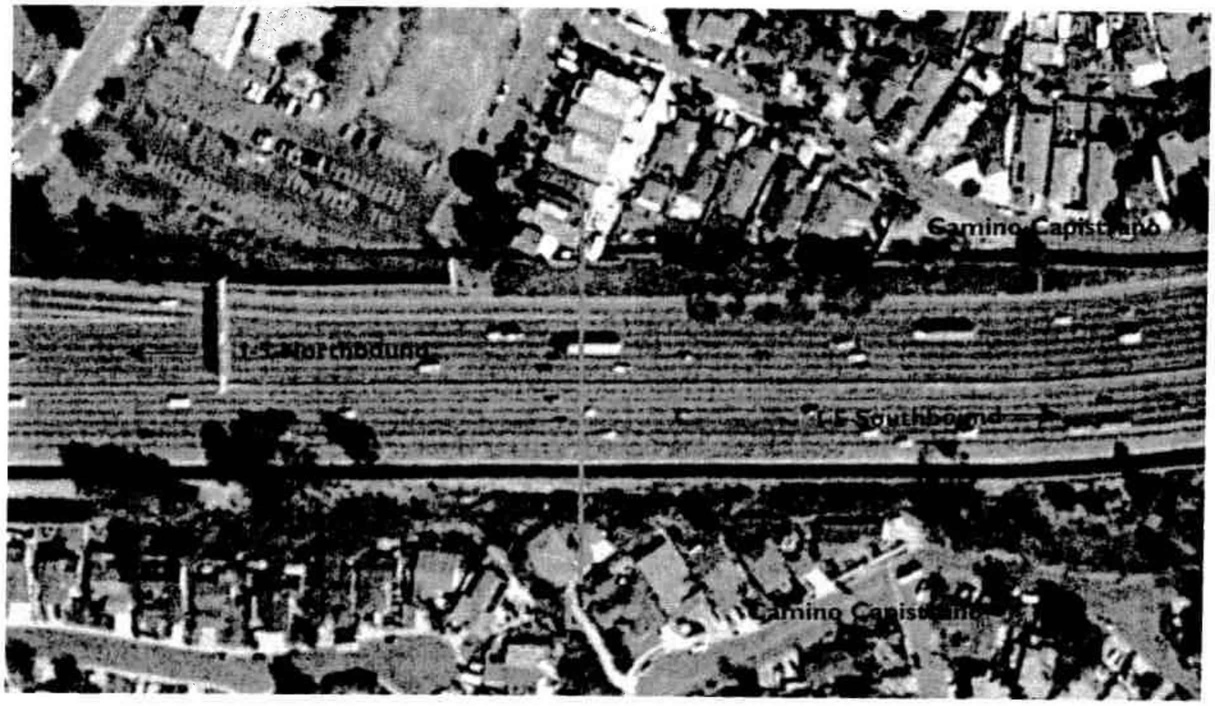
Existing Cross Section



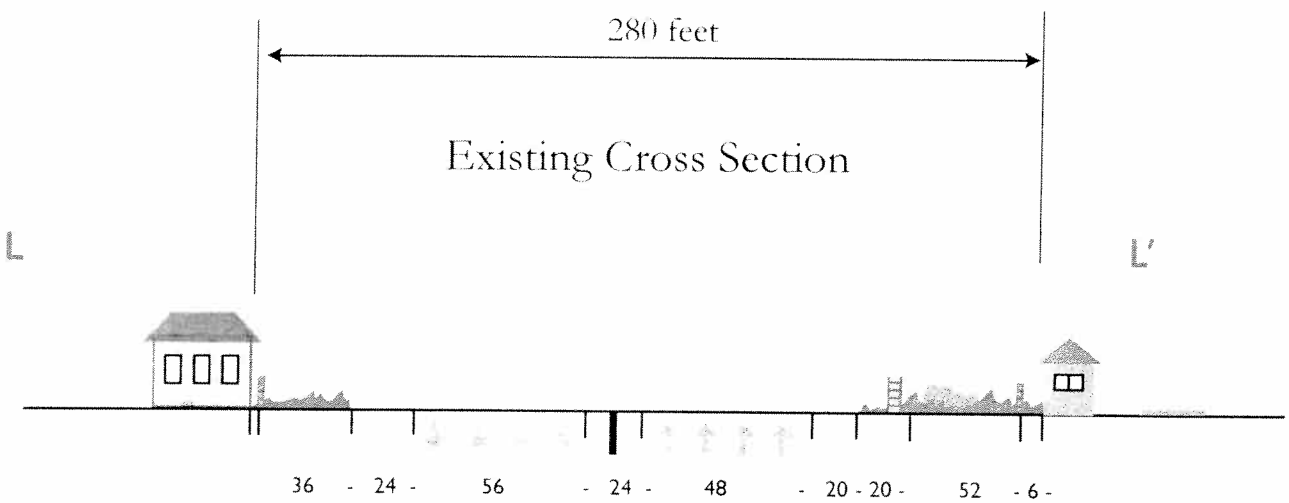
Proposed AIP Cross Section



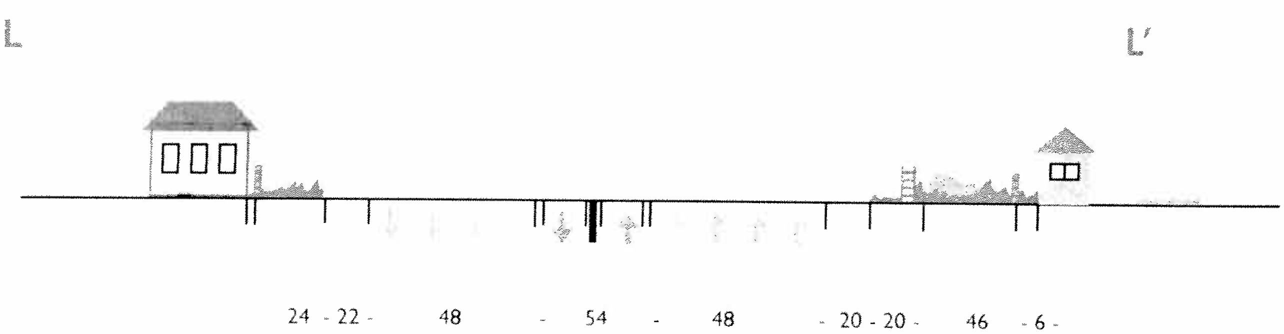
Cross Section L
Dana Point



Existing Cross Section

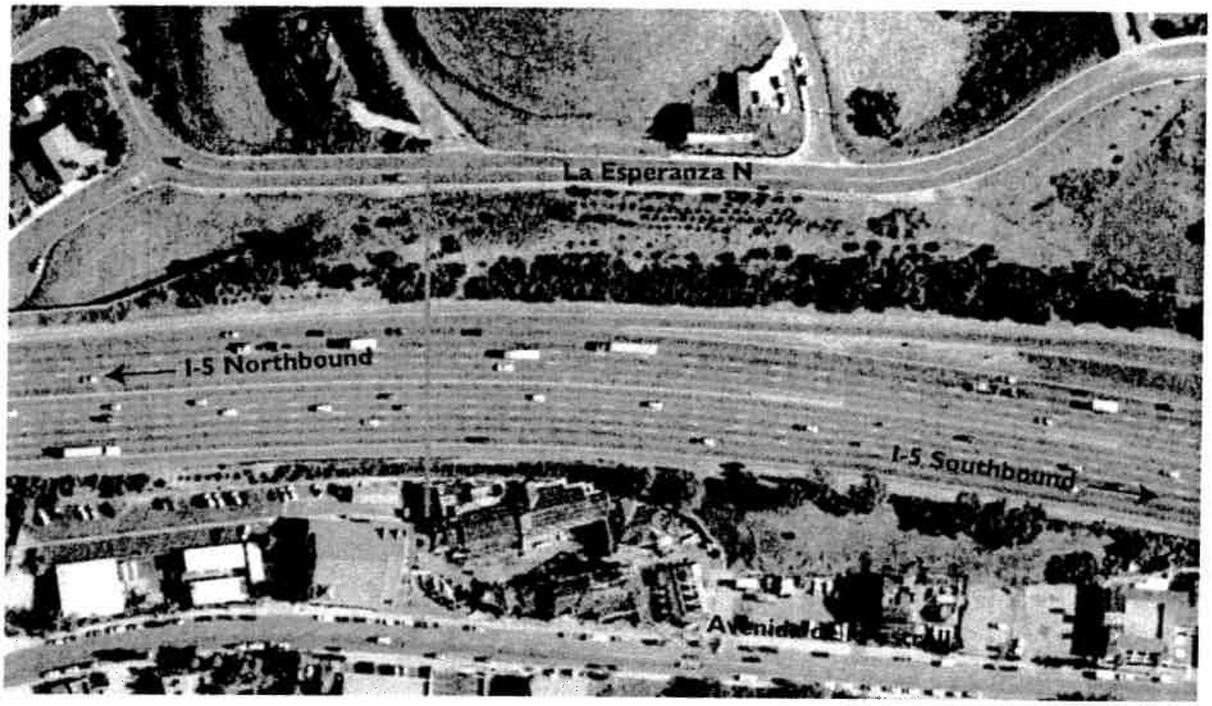


Proposed AIP Cross Section

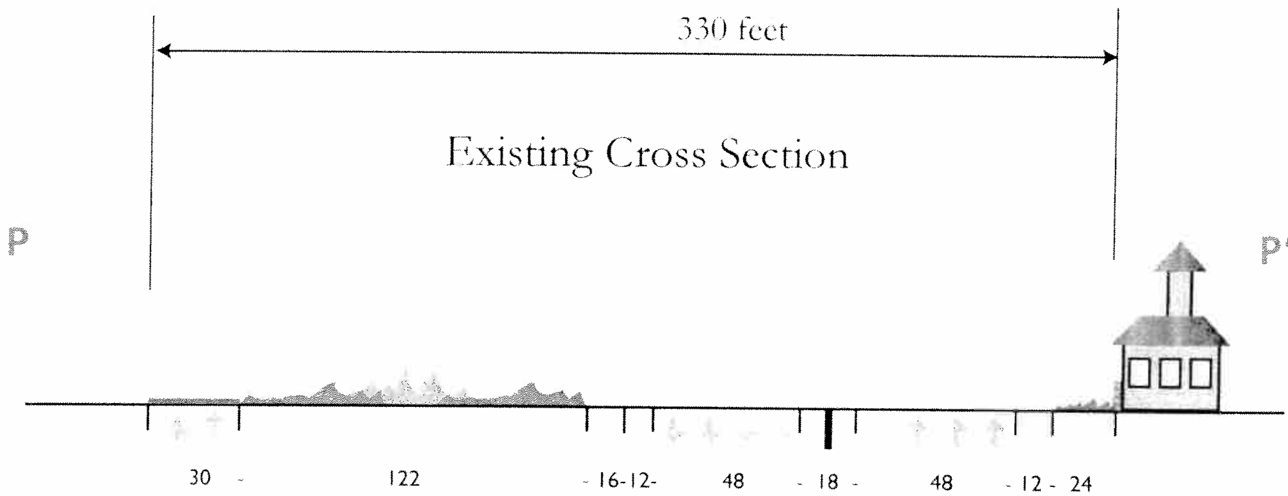


Cross Section P

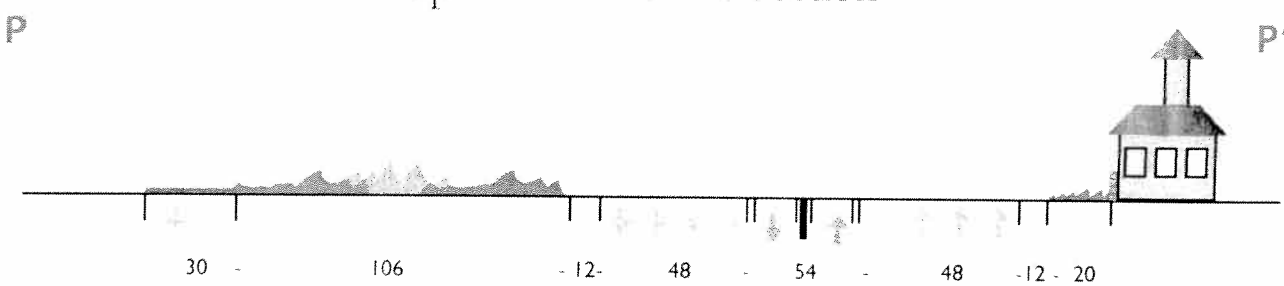
San Clemente



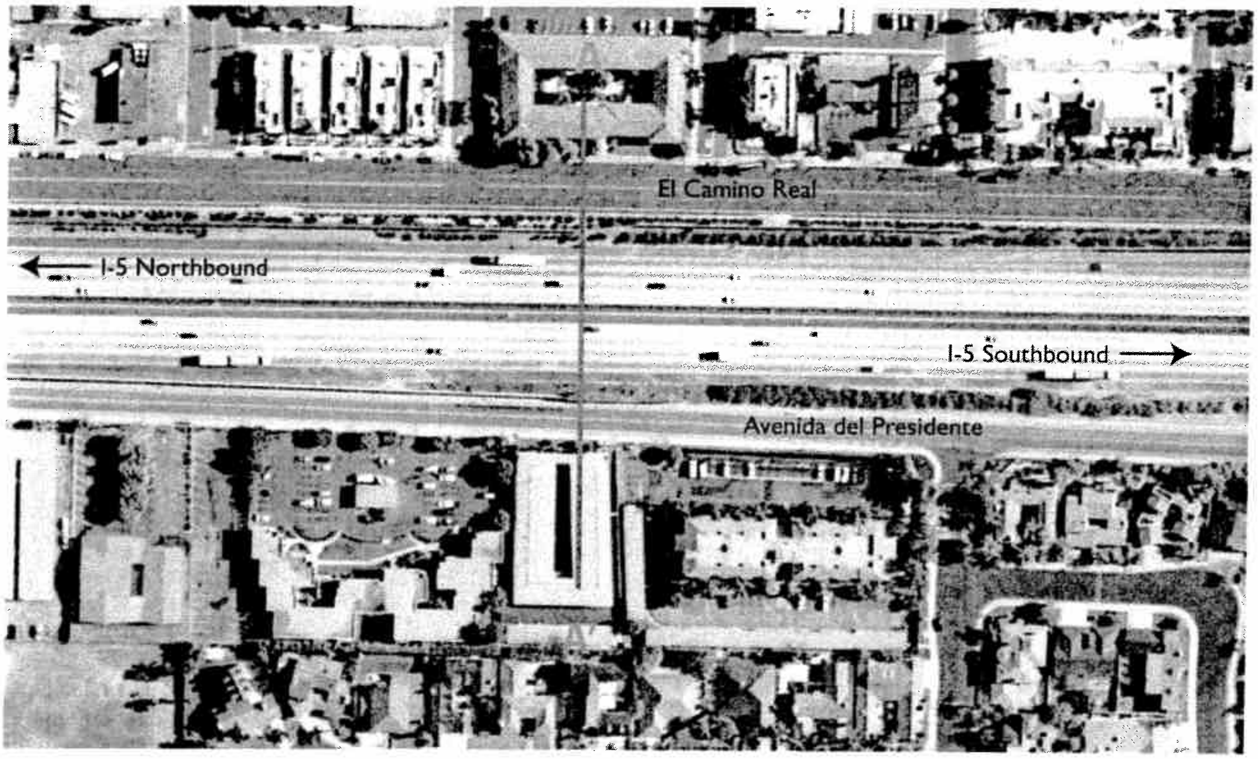
Existing Cross Section

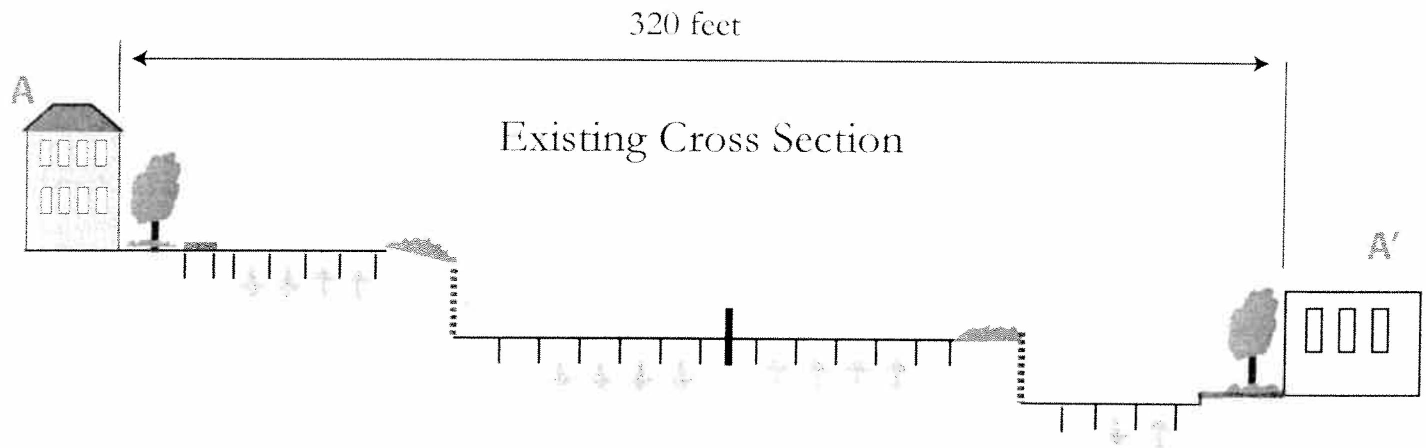


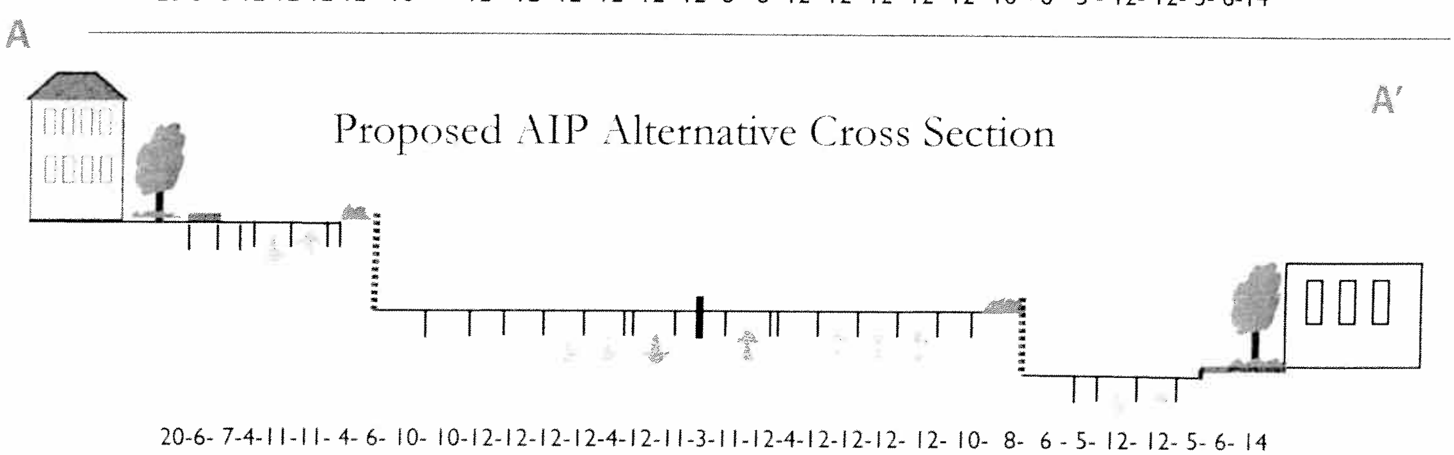
Proposed AIP Cross Section

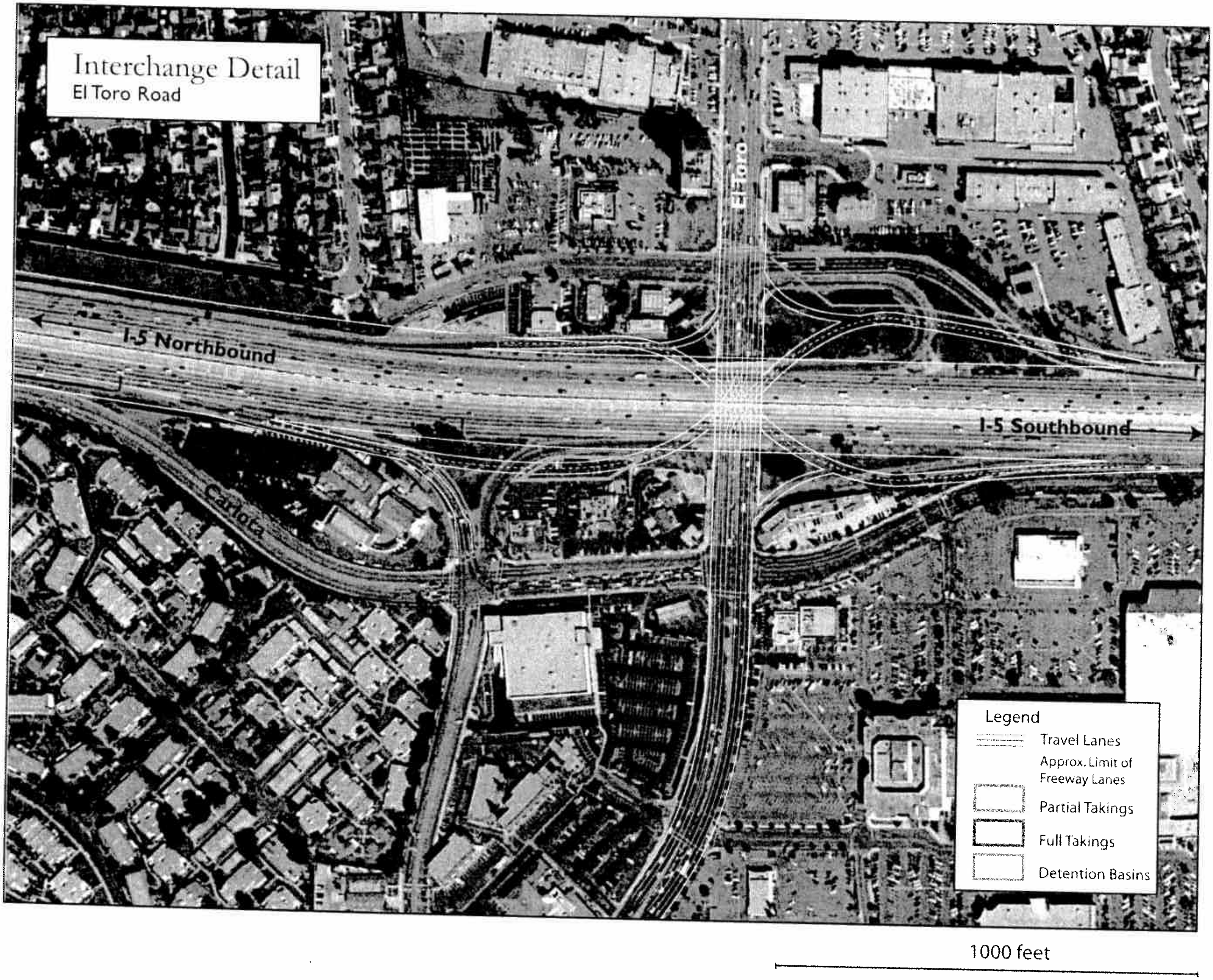


Cross Section S
San Clemente

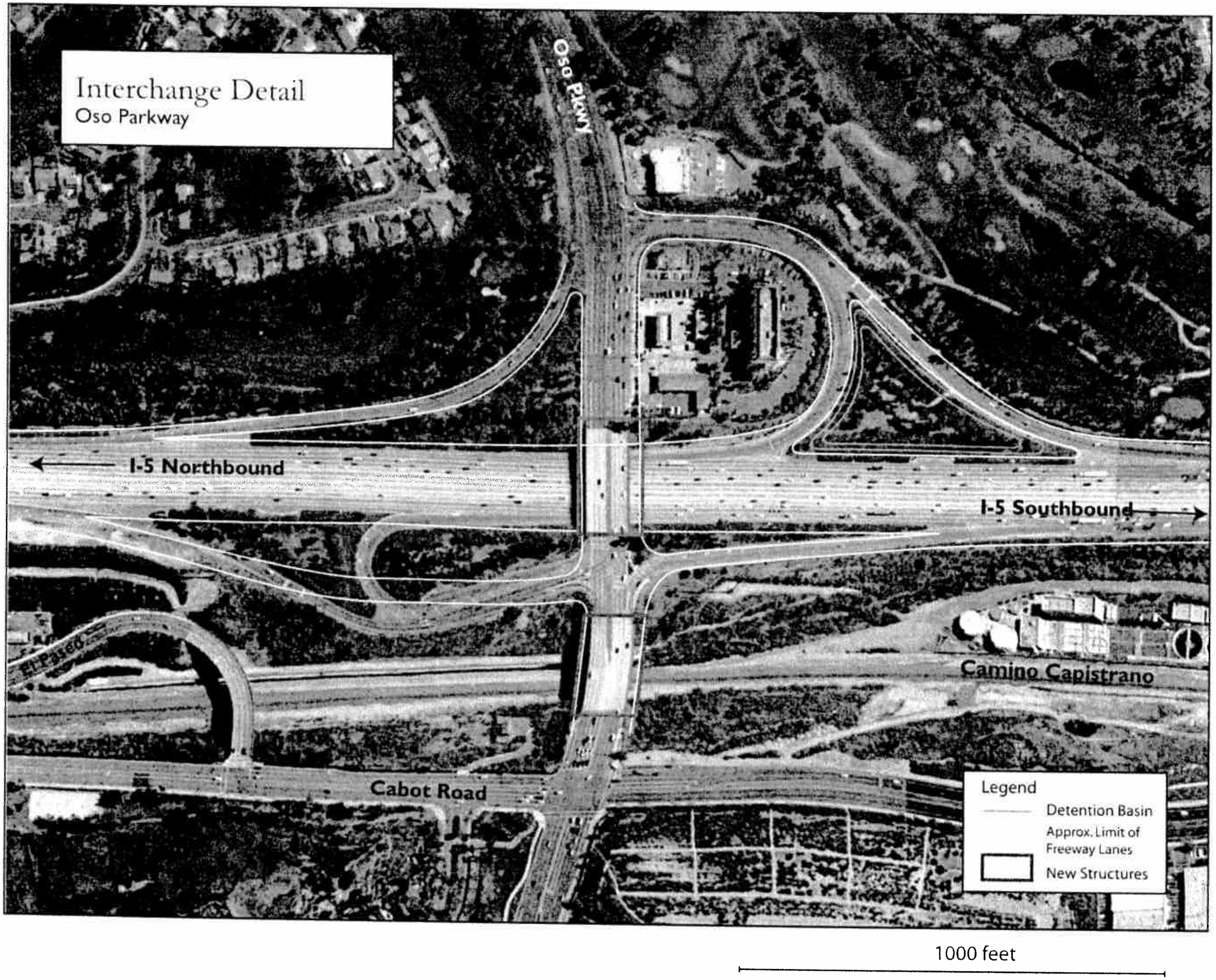


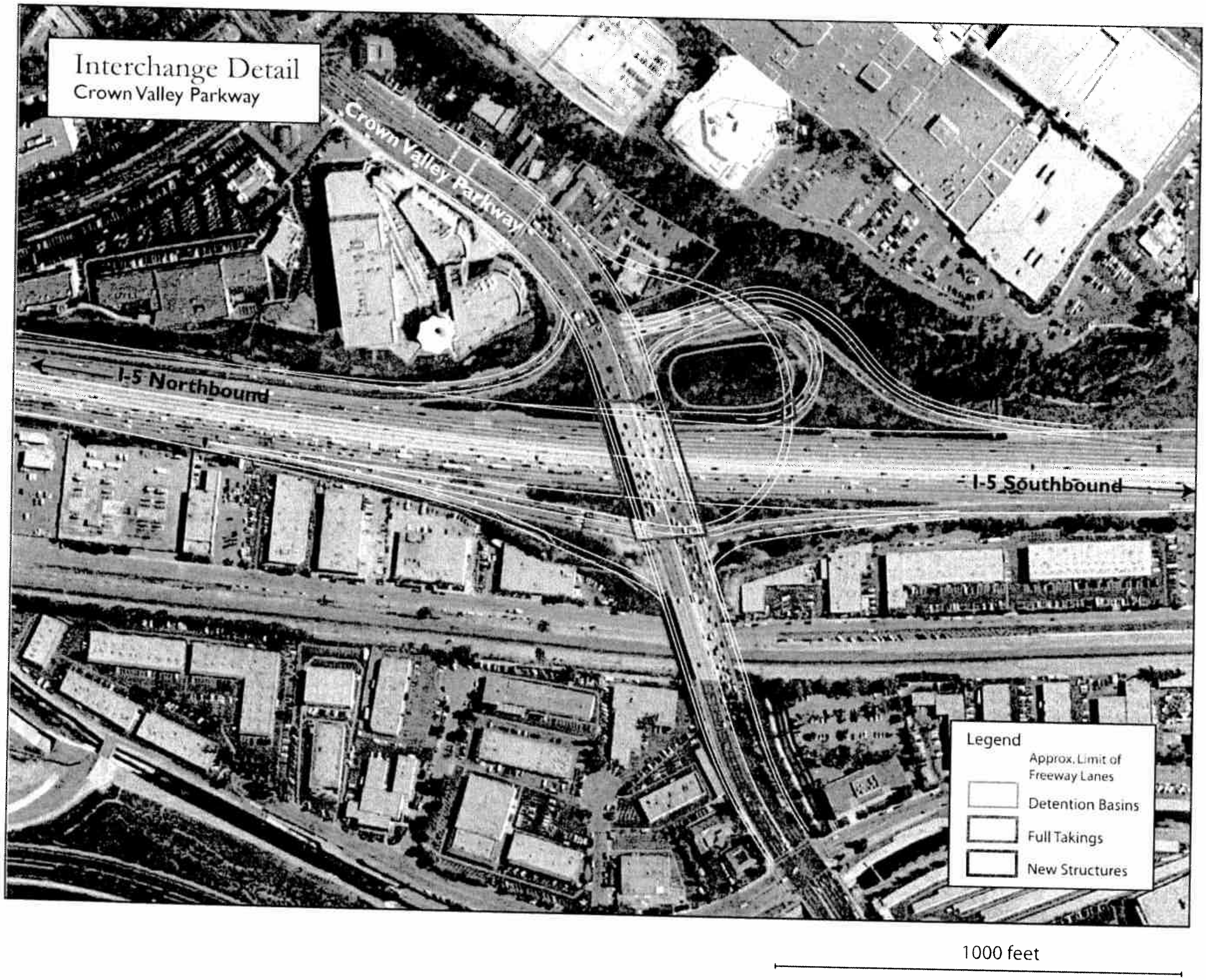




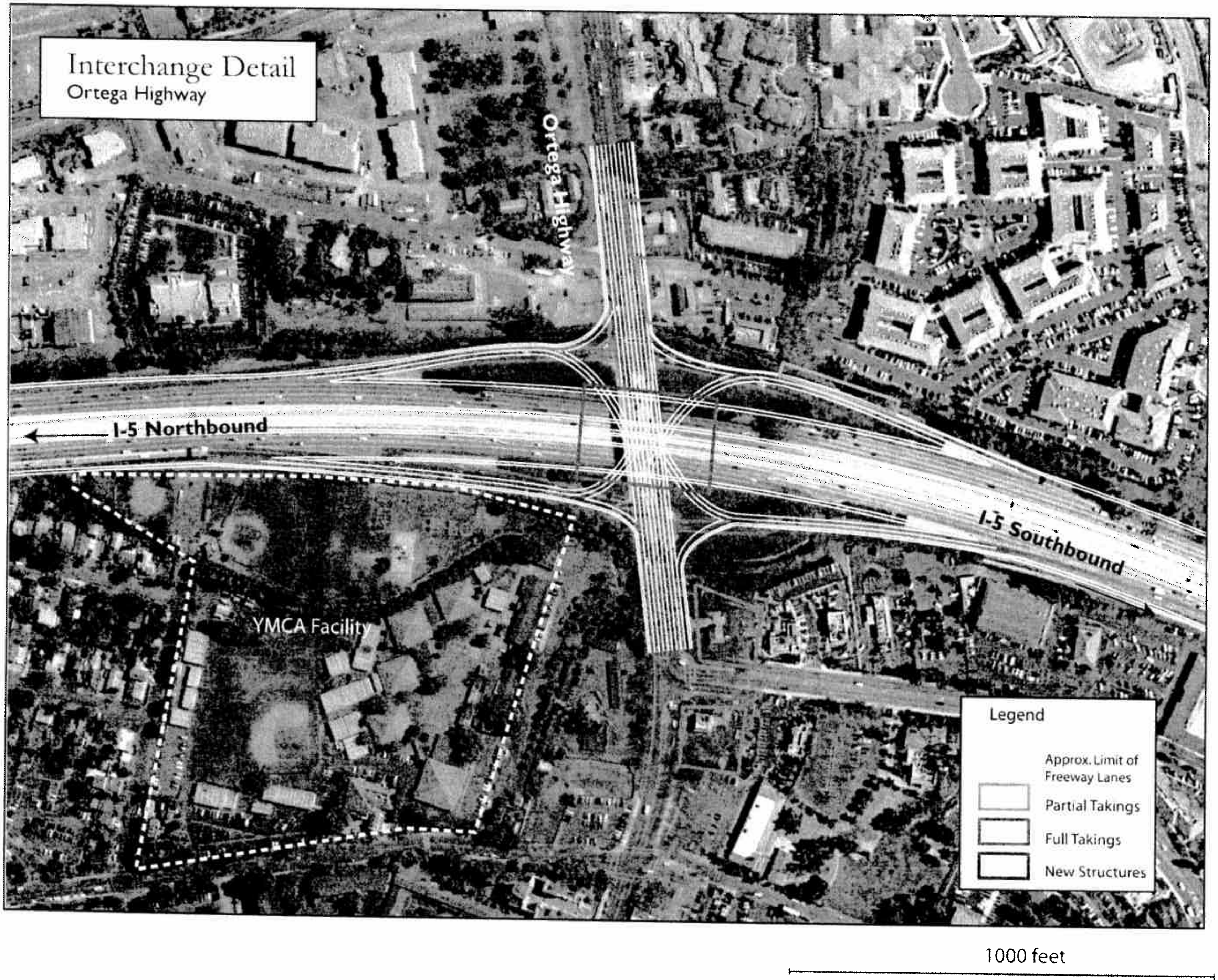

Interchange Detail
El Toro Road
I-5 Northbound
I-5 Southbound
El Toro
Carlota
Legend
Travel Lanes
Approx. Limit of Freeway Lanes
Partial Takings
Full Takings
Detention Basins
1000 feet

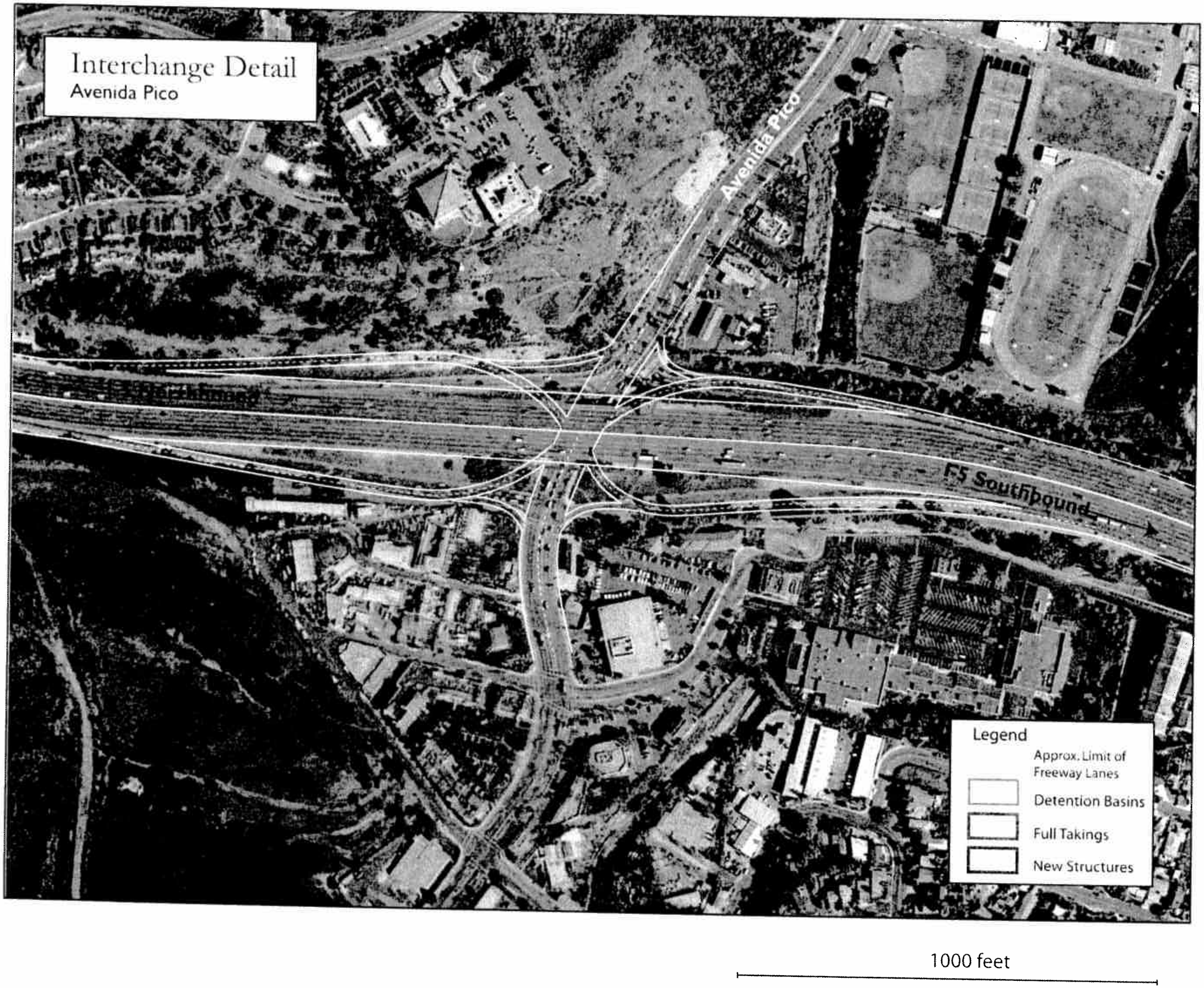

Interchange Detail
La Paz
La Paz
I-5 Northbound
I-5 Southbound
Legend
Approx. Limit of Freeway Lanes
New Structures
1000 feet


Interchange Detail
Oso Parkway
Oso Pkwy
I-5 Northbound
I-5 Southbound
El Paseo
Camino Capistrano
Cabot Road
Legend
Detention Basin
Approx. Limit of Freeway Lanes
New Structures
1000 feet



Interchange Detail
Crown Valley Parkway
Crown Valley Parkway
I-5 Northbound
I-5 Southbound
Legend
Approx. Limit of Freeway Lanes
Detention Basins
Full Takings
New Structures
1000 feet


Interchange Detail
Ortega Highway
Ortega Highway
I-5 Northbound
I-5 Southbound
YMCA Facility
Legend
Approx. Limit of Freeway Lanes
Partial Takings
Full Takings
New Structures
1000 feet


Interchange Detail
Avenida Pico
Avenida Pico
I-5 Southbound
Legend
Approx. Limit of Freeway Lanes
Detention Basins
Full Takings
New Structures
1000 feet

Interchange Detail
El Camino Real

1,000 feet

Source Data: NASA 2005

Legend
Approx. Limit of Freeway Lanes
Property Takings
New Structures

LUCINDA GIBSON, PE, PRINCIPAL

lgibson@smartmobility.com

EDUCATION

- Master of Science in Engineering Sciences, Dartmouth College, Hanover, NH, 1988
- Bachelor of Science in Civil Engineering, University of Vermont, Burlington, VT, 1983

PROFESSIONAL EXPERIENCE:

Ms. Gibson helped found Smart Mobility, Inc. in 2001 and is its President. Since starting the company, Ms. Gibson has developed a national practice of innovative transportation engineering designs that meet today's challenges, and advance smarter growth and new urbanism. Her current work at Smart Mobility focuses on context sensitive and multi-modal traffic engineering, preparing alternative transportation solutions for conventional roadway projects, and preparing comprehensive, multimodal community transportation plans. This work includes bicycle and pedestrian planning and design, scenic byway corridor planning, and moving beyond conventional traffic engineering by addressing traffic congestion through improving transportation networks, consideration of land use and development patterns, and broadening the range of options in terms of both routes and modes. Prior to this, she was employed for 7 years at the Two Rivers-Ottauquechee Regional Commission as a Senior Transportation Planner, and for the previous 6 years at Resource Systems Group, Inc.

Selected Project Experience

Decommissioning of the Sheridan Expressway—Ms Gibson analyzed the options for the future of the Sheridan Expressway given the need to reconstruct one of its interchanges with the Bruckner Expressway in the South Bronx, New York City. This work was conducted for the award winning Sustainable South Bronx organization, and also included an evaluation of the economic benefits that would result to the community from the decommissioning.

Burlington Transportation Plan, Burlington, Vermont—Prepared a comprehensive, multimodal transportation master plan for the City of Burlington, Vermont, which included innovative transportation street design guidelines, parking strategies, evaluation for selected "road diets", and development of a town-wide bicycle network.

Obesity and the Built Environment—Conducting research on how the "Built Environment" as part of a team with researchers from the Dartmouth Medical School, Hanover, NH. , Evaluating the effects of transportation infrastructure and land use patterns on the health and obesity levels of children in 30 communities representing a wide array of types in VT and NH. Funded by the National Institute of Environmental Health Sciences.

Two Lane Plan for PA Route 41—Prepared conceptual plan alternative to a Four lane limited access widening proposed by Pennsylvania DOT for PA Route 41 through Chester County, PA. Analysis include use of RODEL for roundabout analysis and design, and VISSIM for developing corridor-wide measures and informational display. Plan is under consideration by PennDOT as an alternative to constructing a four lane limited access highway.

Halfmoon, NY Transportation Analysis and Plan-As part of a project team with Behan Planning Associates to develop an innovative plan for hamlet and mixed use center development in a rapidly growing suburb outside Albany, NY. Plan elements included improves street connectivity within proposed growth areas, pedestrian oriented designs and in the hamlet and mixed use areas, and illustrating access management concepts for the main highway corridors.

Barnard Villages Traffic and Growth Management Plan—Developed a plan for Barnard, Vermont's two village areas, including intersection safety, pedestrian circulation, traffic calming, establishing village identity, re-designing lakefront parking on Silver Lake, and exploring opportunities for infill development.

Chicago Metropolis 2020 Plan for Growth and Transportation-Contributed to this APA Burnham Award-winning project to explore alternative scenarios for growth and transportation investment and management for the Chicago Region. Developed alternative transportation investment strategies and budgets, and prepared modeling input files to analyze these scenarios with an advanced regional TransCAD model.

Dresden School Transportation Committee—Conducted study on the Feasibility of Queue Jump Lane for the Ledyard Bridge Approach in Norwich, Vermont. Reviewed options and obstacles for establishing a bus-only during morning peak hours for buses, with the goal of reducing bus travel time and encouraging school bus and public transit use between Norwich, Vermont and Hanover, New Hampshire.

Prairie Crossing Boulevard Plan, Grayslake, Illinois-Developed context sensitive integrated transportation and land use alternative plan for an abandoned Tollway right-of-way through a new urbanist development in Grayslake, Illinois. Integrated traffic and transportation design into community street network and land use patterns. Plan features landscaped boulevards, roundabouts, and improved street connectivity in the area.

PROFESSIONAL CERTIFICATIONS AND MEMBERSHIPS

- Professional Engineer – P.E., Vermont Board of Professional Engineering, License #6133
- Member, Institute of Transportation Engineers (ITE)
- Member, Congress for the New Urbanism, Transportation Planning Committee
- Member, Board of Directors, CNU New England Chapter of CNU
- Member, ITE/CNU Design Standards Task Force

PUBLICATIONS

Context Sensitive Design Approach for the Route 41 Corridor, Gibson, Lucinda E., and Dee Durham. Presented the Historic Roads National Conference in Portland, OR. Described multi-faceted approach including research, public involvement and education, used to develop a context sensitive plan for improvements to PA Route 41, an NHS route through scenic rural landscapes and Amish farms. April, 2004.

Chicago Metropolis 2020: The Business Community Develops an Integrated Land Use/Transportation Plan, Gibson, Lucinda E., Frank Beal, John Fregonese, Norman Marshall. Presented at the ITE 2003 Technical Conference, *Transportation's Role in Successful Communities* Presented in Fort Lauderdale, FL, 2003.

Functional Classification for Multimodal Planning, Strate, Harry E., Elizabeth Humstone, Susan McMahon, Lucy Gibson and Bruce D. Bender, Transportation Research Record #1606, Transportation Planning, Programming, and Land Use, National Academy Press, Washington DC, 1997.

SPEAKING ENGAGEMENTS (Partial List)

Smart Growth Alternative for the Mountain View Highway Corridor, presented at the Citizens Organized for Smarter Alternatives to the Lehi City Council, Lehi, Utah, March, 2007.

Smarter Alternatives to Highway Projects. Presented at the American Planning Association annual meeting in San Antonio, TX, April, 2006.

Context Sensitive Traffic Engineering for Historic Road Corridors. Presented at the biannual Historic Roads Conference, Portland, Oregon, April, 2004.

Emerging Transportation Planning Techniques for Smart Growth Planning. Presented at the Smart Growth Network annual conference in Burlington, VT, September, 2003.

NORMAN L. MARSHALL, PRINCIPAL

nmarshall@smartmobility.com

EDUCATION:

Master of Science in Engineering Sciences, Dartmouth College, Hanover, NH, 1982
Bachelor of Science in Mathematics, Worcester Polytechnic Institute, Worcester, MA, 1977

PROFESSIONAL EXPERIENCE:

Norm Marshall helped found Smart Mobility, Inc. in 2001. Prior to this, he was at Resource Systems Group, Inc. for 14 years where he developed a national practice in travel demand modeling. He specializes in analyzing the relationships between the built environment and travel behavior, and doing planning that coordinates multi-modal transportation with land use and community needs.

Transit Planning

Regional Transportation Authority (Chicago) and Chicago Metropolis 2020 – evaluating alternative 2020 and 2030 system-wide transit scenarios including deterioration and enhance/expand under alternative land use and energy pricing assumptions in support of initiatives for increased public funding.

Capital Metropolitan Transportation Authority (Austin, TX) Transit Vision – analyzed the regional effects of implementing the transit vision in concert with an aggressive transit-oriented development plan developed by Calthorpe Associates. Transit vision includes commuter rail and BRT.

Bus Rapid Transit for Northern Virginia HOT Lanes (Breakthrough Technologies, Inc and Environmental Defense.) – analyzed alternative Bus Rapid Transit (BRT) strategies for proposed privately-developing High Occupancy Toll lanes on I-95 and I-495 (Capital Beltway) including different service alternatives (point-to-point services, trunk lines intersecting connecting routes at in-line stations, and hybrid).

Central Ohio Transportation Authority (Columbus) – analyzed the regional effects of implementing a rail vision plan on transit-oriented development potential and possible regional benefits that would result.

Essex (VT) Commuter Rail Environmental Assessment (Vermont Agency of Transportation and Chittenden County Metropolitan Planning Organization)—estimated transit ridership for commuter rail and enhanced bus scenarios, as well as traffic volumes.

Georgia Intercity Rail Plan (Georgia DOT)—developed statewide travel demand model for the Georgia Department of Transportation including auto, air, bus and rail modes. Work included estimating travel demand and mode split models, and building the Departments ARC/INFO database for a model running with a GIS user interface.

Regional Land Use/Transportation Scenario Planning

Chicago Metropolis Plan and Chicago Metropolis Freight Plan (6-county region)— developed alternative transportation scenarios, made enhancements in the regional travel demand model, and used the enhanced model to evaluate alternative scenarios including development of alternative regional transit concepts. Developed multi-class assignment model and used it to analyze freight alternatives including congestion pricing and other peak shifting strategies. Chicago Metropolis 2020 was awarded the Daniel Burnham Award for regional planning in 2004 by the American Planning Association, based in part on this work.

Mid-Ohio Regional Planning Commission Regional Growth Strategy (7-county Columbus region)—developed alternative future land use scenarios and calculated performance measures for use in a large public regional visioning project.

Envision Central Texas Vision (5-countyregion)—implemented many enhancements in regional model including multiple time periods, feedback from congestion to trip distribution and mode choice, new life style trip production rates, auto availability model sensitive to urban design variables, non-motorized trip model sensitive to urban design variables, and mode choice model sensitive to urban design variables and with higher values of time (more accurate for "choice" riders). Analyzed set land use/transportation scenarios including developing transit concepts to match the different land use scenarios.

Baltimore Vision 2030—working with the Baltimore Metropolitan Council and the Baltimore Regional Partnership, increased regional travel demand model's sensitivity to land use and transportation infrastructure. Enhanced model was used to test alternative land use and transportation scenarios including different levels of public transit.

Burlington (Vermont) Transportation Plan – Leading team developing Transportation Plan focused on supporting increased population and employment without increases in traffic by focusing investments and policies on transit, walking, biking and Transportation Demand Management.

Roadway Corridor Planning

State Routes 5 & 92 Scoping Phase (NYSDOT) —evaluated TSM, TDM, transit and highway widening alternatives for the New York State Department of Transportation using local and national data, and a linkage between a regional network model and a detailed subarea CORSIM model.

Twin Cities Minnesota Area and Corridor Studies (MinnDOT)—improved regional demand model to better match observed traffic volumes, particularly in suburban growth areas. Applied enhanced model in a series of subarea and corridor studies.

Developing Regional Transportation Model

Pease Area Transportation and Air Quality Planning (New Hampshire DOT)—developed an integrated land use allocation, transportation, and air quality model for a three-county New Hampshire and Maine seacoast region that covers two New Hampshire MPOs, the Seacoast MPO and the Salem-Plaistow MPO.

Syracuse Intermodal Model (Syracuse Metropolitan Transportation Council)—developed custom trip generation, trip distribution, and mode split models for the Syracuse Metropolitan Transportation Council. All of the new models were developed on a person-trip basis, with the trip distribution model and mode split models based on one estimated logit model formulation.

Portland Area Comprehensive Travel Study (Portland Area Comprehensive Transportation Study)—Travel Demand Model Upgrade—enhanced the Portland Maine regional model (TRIPS software). Estimated person-based trip generation and distribution, and a mode split model including drive alone, shared ride, bus, and walk/bike modes.

Chittenden County ISTEA Planning (Chittenden County Metropolitan Planning Organization)—developed a land use allocation model and a set of performance measures for Chittenden County (Burlington) Vermont for use in transportation planning studies required by the Intermodal Surface Transportation Efficiency Act (ISTEA).

Research

Obesity and the Built Environment (National Institutes of Health and Robert Wood Johnston Foundation) – Working with the Dartmouth Medical School to study the influence of local land use on middle school students in Vermont and New Hampshire, with a focus on physical activity and obesity.

The Future of Transportation Modeling (New Jersey DOT)—Member of Advisory Board on project for State of New Jersey researching trends and directions, and making recommendations for future practice.

Trip Generation Characteristics of Multi-Use Development (Florida DOT)—estimated internal vehicle trips, internal pedestrian trips, and trip-making characteristics of residents at large multi-use developments in Fort Lauderdale, Florida.

Improved Transportation Models for the Future—assisted Sandia National Laboratories in developing a prototype model of the future linking ARC/INFO to the EMME/2 Albuquerque model and adding a land use allocation model and auto ownership model including alternative vehicle types.

Peer Reviews and Critiques

C-470 (Denver region) – Reviewed express toll lane proposal for Douglas County, Colorado and prepared reports on operations, safety, finances, and alternatives.

Intercounty Connector (Maryland) – Reviewed proposed toll road and modeled alternatives with different combinations of roadway capacity, transit capacity (both on and off Intercounty Connector) and pricing.

Foothills South Toll Road (Orange County, CA) – Reviewed modeling of proposed toll road.

I-93 Widening (New Hampshire) – Reviewed Environment Impact Statement and modeling, with a particular focus on induced travel and secondary impacts, and also a detailed look at transit potential in the corridor.

Stillwater Bridge – Participated in 4-person expert panel assembled by Minnesota DOT to review modeling of proposed replacement bridge in Stillwater, with special attention to land use, induced travel, pricing, and transit use.

Ohio River Bridges Projects– Reviewed Environmental Impact Statement for proposed new freeway bridge east of Louisville Kentucky for River Fields, a local land trust and historic preservation not-for-profit organization.

Indiana I-69 – Reviewed model analyses from Indiana statewide travel demand model of proposed new Interstate highway for coalition, including the Environmental Law and Policy Center of the Midwest.

Washington, DC region – Reviewed modeling of Potomac River bridge crossings.

Phoenix, Arizona – Reviewed conformity analyses and long-term transportation plan under contract to Tempe, a municipality in the Phoenix region.

Atlanta, Georgia – Reviewed conformity analyses and long-term transportation plan for an environmental coalition.

Daniel Island (Charleston, South Carolina) – Reviewed Draft Environmental Impact Statement for large proposed Port expansion (the "Global Gateway") for an environmental coalition.

Houston, Texas– Analyzed air quality conformity and long-term transportation plan for an environmental coalition.

PUBLICATIONS AND PRESENTATIONS (partial list)

Sketch Transit Modeling Based on 2000 Census Data, with Brian Grady. Presented at the Annual Meeting of the Transportation Research Board, Washington DC, January 2006, and *Transportation Research Record*, No. 1986, "Transit Management, Maintenance, Technology and Planning", p. 182-189, 2006.

Travel Demand Modeling for Regional Visioning and Scenario Analysis, with Brian Grady. Presented at the Annual Meeting of the Transportation Research Board, Washington DC, January 2005, and *Transportation Research Record*, No. 1921, "Travel Demand 2005", p. 55-63, 2006.

Chicago Metropolis 2020: the Business Community Develops an Integrated Land Use/Transportation Plan, with Brian Grady, Frank Beal and John Fregonese, presented at the Transportation Research Board's Conference on Planning Applications, Baton Rouge LA, April 2003.

Chicago Metropolis 2020: the Business Community Develops an Integrated Land Use/Transportation Plan, with Lucinda Gibson, P.E., Frank Beal and John Fregonese, presented at the Institute of Transportation Engineers Technical Conference on Transportation's Role in Successful Communities, Fort Lauderdale FL, March 2003.

Evidence of Induced Travel, with Bill Cowart, presented in association with the Ninth Session of the Commission on Sustainable Development, United Nations, New York City, April 2001.

Induced Demand at the Metropolitan Level – Regulatory Disputes in Conformity Determinations and Environmental Impact Statement Approvals, Transportation Research Forum, Annapolis MD, November 2000.

Evidence of Induced Demand in the Texas Transportation Institute's Urban Roadway Congestion Study Data Set, Transportation Research Board Annual Meeting, Washington DC: January 2000.

Subarea Modeling with a Regional Model and CORSIM", with K. Kaliski, presented at Seventh National Transportation Research Board Conference on the Application of Transportation Planning Methods, Boston MA, May 1999.

New Distribution and Mode Choice Models for Chicago, with K. Ballard, Transportation Research Board Annual Meeting, Washington DC: January 1998.

Land Use Allocation Modeling in Uni-Centric and Multi-Centric Regions, with S. Lawe, Transportation Research Board Annual Meeting, Washington DC: January 1996.

Multimodal Statewide Travel Demand Modeling Within a GIS, with S. Lawe, Transportation Research Board Annual Meeting, Washington DC: January 1996.

Linking a GIS and a Statewide Transportation Planning Model, with L. Barbour and Judith LaFavor, Urban and Regional Information Systems Association (URISA) Annual Conference, San Antonio, TX, July 1995.

Land Use, Transportation, and Air Quality Models Linked With ARC/INFO, with C. Hanley, C. Blewitt, and M. Lewis, Urban and Regional Information Systems Association (URISA) Annual Conference,: San Antonio, TX, July 1995.

Forecasting Land Use Changes for Transportation Alternative, with S. Lawe, Fifth National Conference on the Application of Transportation Planning Methods, Seattle WA, April 1995.

Forecasting Land Use Changes for Transportation Alternatives, with S. Lawe, Fifth National Conference on the Application of Transportation Planning Methods (Transportation Research Board),: Seattle WA, April 1995.

Integrated Transportation, Land Use, and Air Quality Modeling Environment, with C. Hanley and M. Lewis Fifth National Conference on the Application of Transportation Planning Methods (Transportation Research Board), Seattle WA, April 1995.

MEMBERSHIPS/AFFILIATIONS

Member, Institute of Transportation Engineers
Individual Affiliate, Transportation Research Board
Member, American Planning Association
Member, Congress for the New Urbanism
Technical Advisory Committee Member and past Board Member, Vital Communities (VT/NH)

Bob Battalio, P. E.

Principal

Mr. Battalio has extensive experience with flood management, restoration design, coastal engineering, preparation of construction documents, and project management. His training and work experience is focused in the coastal and estuarine areas, wetland and creek restoration design, and waterfront civil engineering projects. He has directed all phases of waterfront and restoration civil works, including field data collection, conceptual design, preliminary design/feasibility analysis, final design/construction documents, and construction management.

Education

M.E., 1985 — Civil Engineering (Coastal Engineering)
University of California, Berkeley

B.S., 1983 — Civil Engineering,
Virginia Polytechnic Institute and State University, Summa Cum Laude

Professional Registration

Civil Engineer, State of California, C41765; State of Washington, 42109

Memberships

Chi Epsilon National Civil Engineering Honor Society
American Society of Civil Engineers
American Shore and Beach Preservation Association (Years 2000–2004 Director, Northern California Vice President)
The Surfrider Foundation
California Marine Parks and Harbors Association (Year 2000 and 2001 State President)

Selected Project Experience

Napa Salt Ponds Restoration Studies, San Pablo Bay / Napa River, California, 1998–2005, for the State Coastal Conservancy and US Army Corps, San Francisco District. Project director for conceptual design, modeling of hydrodynamics, sediment transport and salinity, habitat conversion modeling, engineering feasibility and restoration design. Also, field data collection and analysis, and coordination with surveying and feasibility study and EIS/R preparation, and conformance with Corps' procedures. Mr. Battalio was engineer of record for final design (preparation of construction documents) for the Phase 1 restoration. Phase 1 restoration totaled 3,000 acres of former salt ponds (Ponds 3,4 and 5), and was successfully completed within the estimated budget and schedule in early 2007.

Guidelines and Specifications for Coastal Flood Mapping, 2004. Contributed to a large study performed for the Federal Emergency Management Agency (FEMA). PWA participated in the evaluation and update of FEMA's Guidelines and Specifications for mapping of coastal flood hazards on the Pacific Coast. Mr. Battalio led key technical areas: wave transformations, wave runup and overtopping, definition of the 100-year event in terms of joint occurrence of high wind wave and high water levels, and wind wave generation in sheltered waters such as San Francisco Bay.

Wind Wave Study, DRMS, 2006-7. Provided technical leadership for a focused study of wind wave generation in the Sacramento-San Joaquin Rivers Delta for the Delta Risk Management Study (DRMS). Wind data were analyzed and converted into a spatial probabilistic model of speed and direction. Parametric wind wave generation and wave runup equations were converted into look-up tables to facilitate evaluation for a range of wind and fetch conditions. The tools were provided for use in evaluating the risk in wave-induced damages to flood control levees, within the overall levee failure risk assessment.

Selected Project Experience (continued)

Coastal Flood Mapping, Washington, 2000-2005. Directing analyses of coastal flooding and flood hazard mapping for Whatcom County, Washington (Puget Sound), in cooperation with FEMA Region X. Mapping was accomplished for Sandy Point and Birch Bay. Key issues include tides, water levels, winds, wind wave generation, wave runup, overtopping, and coastal structure evaluation. New methodologies were developed to better represent the flood potential for sheltered waters of Puget Sound, and influenced the development of the Guidelines and Specifications for Pacific Coastal Flood Studies.

Pacifica State Beach Restoration, 2000-2004. Led coastal engineering and geomorphology services provided to the City of Pacifica for restoration of Pacifica State Beach. The project entailed evaluation of the beach morphology including consideration of sea level rise, flooding, erosion and the effect of prior disturbances. Recommendations included a set-back zone from which fill and development were removed, and the geometry to be restored with sands and cobbles consistent with the native materials. The project was constructed in 2004, and was awarded Best Restored Beach (2005) by the American Shore and Beach Preservation Association. The project involved a multi-discipline team and included sand placement for beach nourishment, removal of coastal armoring, demolition of buildings, renovation of restroom / showers and parking, a new bike and pedestrian trail, and storm water treatment wetlands. Also, beach restoration accommodated enhancement of the San Pedro Creek mouth and lagoon for ecologic and coastal / fluvial flood control benefits.

Surfer's Point Coastal Restoration, 2004 – ongoing. Led coastal engineering and geomorphology services provided to the City of San Buenaventura, California, for restoration of a highly disturbed and highly used shore at the Ventura River Mouth. The restoration consists of placing a cobble berm and dunes in the paved area and setting back the bike path and other development 65 ft landward of the existing bike bath. The project is permitted and the design phase started in 2007.

Goleta Beach, California, The Goleta Beach Master Planning and Community Visioning Process developed alternative plans for Goleta Beach County Parks; A key objective was sustainability over 20 years, taking into account long-term environmental change. The proposed study will provide information on the likely future evolution of the shoreline and provide a conceptual design based on the vision developed by the Working Group.

South San Francisco Bay Salt Pond Restoration, 2004- ongoing. PWA is leading a team of consultants to help plan and implement restoration of 15,100 acres of salt ponds in south San Francisco Bay, California. Mr. Battalio provided leadership for Coastal Flood Management and Wetland Restoration Design aspects of the project.

Martinez Regional Shoreline Marsh Restoration Project, California, 1998–2002. Directed construction document preparation construction support activities for this combined flood control and tidal wetlands restoration project at the mouth of Alhambra Creek. The project satisfies mitigation requirements for Caltrans and enhances public access facilities for the East Bay Regional Park District while providing flood control benefits to the City of Martinez. The project entailed dredging and excavation to increase the creek cross-section, restore adjacent wetland terraces, and restore a tidal wetland basin tributary to the creek. The project was successfully constructed, and Caltrans lauded the project with its Excellence in Transportation Award, The Environment (2003). PWA is presently monitoring the project, which has met all performance goals to date.

Selected Project Experience (continued)

Petaluma Marsh Restoration Design, Novato, California, 2001–2007, for the Marin Audubon Society. Project Director for the design of 100-acre tidal wetland restoration tributary to the Petaluma River. Included design of a flood control levee to mitigate tidal flooding and wave action to adjacent rail corridor. The project was successfully constructed in 2005-2007 and PWA is presently providing monitoring of the site evolution and performance.

Crissy Field Wetland Inlet Studies, San Francisco, California, 1999-2007. For the National Park Service, Golden Gate Parks Conservancy, and Presidio Trust, led the coastal processes evaluation of the inlet and adjacent shore following construction of a new tidal lagoon in Crissy Field Park. One study resulted in a quantified conceptual model of inlet closure and natural breaching frequency to aid in the adaptive management of the system and evaluation of the benefits of expansion of the wetland. The work includes significant monitoring, including directional wave spectra, surveys of inlet morphology, and tracking of sand erosion and deposition.

Larkspur Ferry Terminal Maintenance Dredging, California, 1989–2000, for the Golden Gate Bridge, Highway & Transportation District. Project Engineer responsible for construction documents and permit applications for five episodes of maintenance dredging of the Larkspur Ferry Terminal Berthing Basin and Channel, including over 1,000,000 cubic yards of dredging and disposal.

Selected Papers and Published Reports

Battalio, R.T., D. Danmeier and P. Williams, Predicting Closure and Breaching Frequencies of Small Tidal Inlets – A Quantified Conceptual Model. Proceedings of the 30th International Conference of Coastal Engineering, ASCE,(in press 2007).

Garrity, Nicholas J., Robert Battalio PE, Peter J. Hawkes PhD, Dan Roupe EVALUATION OF EVENT AND RESPONSE APPROACHES TO ESTIMATE THE 100-YEAR COASTAL FLOOD FOR PACIFIC COAST SHELTERED WATERS, Proceedings of the 30th International Conference of Coastal Engineering, ASCE,(in press 2007).

MacArthur, Robert C. , Robert G. Dean and Robert Battalio, **WAVE PROCESSES IN NEARSHORE ENVIRONMENT FOR HAZARD IDENTIFICATION** Proceedings of the 30th International Conference of Coastal Engineering, ASCE,(in press 2007).

Coulton, Kevin G., Bob Battalio, Nick Garrity, Carmela Chandrasekera and Paula Cooper, Coastal Flood Studies in Puget Sound, Washington State, USA, Solutions to Coastal Disasters '02, Conference Proceedings, February 24–27, 2002, San Diego, CA, ASCE, pp 267–281.

Brendan DeTemple, R.T. Battalio, and James Kulpa, Measuring Key Physical Processes in a California Lagoon, Proceedings of the 1999 Conference of the California Shore and Beach Preservation Association, Sand Rights '99, September 23-26, 1999, Ventura, CA, ASCE, pp 133–147.

Battalio, R.T. and R.B. Dornhelm, 1997. Sea level rise in San Francisco Bay, California. Proceedings of the 1997 National Marina Research Conference, International Marina Institute, 16 pp.

Battalio, R.T. and D. Trivedi, 1996. Sediment transport processes at Ocean Beach, San Francisco California. Proceedings of the 25th International Conference, ASCE, *Coastal Engineering* 3(208):2691–2704.

Battalio, R.T. and A. Bertolotti, 1987. Modeling Applications in Coastal Engineering. Proceedings: Coastal Zone '87 Conference, 5th Symposium on Coastal and Ocean Management, Vol. 2, pp. 1630–1643.

Nichol, J., R. Battalio, R. Nathan, R. Boudreau and D. Bombard, 1986. An Example of a Destination Harbor for Pleasure Craft. Bulletin of the Permanent International Association of Navigation Congress, PIANC, No. 55, pp. 33–43.

Battalio, R.T., 1985. A Comparison of Two Methods of Calculating Longshore Sediment Transport Rates Using Field Data. Masters Thesis, U.C. Berkeley, May.

Battalio, R.T., 1984. Selected Techniques for Measuring Directional Wave Spectra. Selected Reports in Ocean and Arctic Engineering, U.C. Berkeley.

Mark Lindley, P.E.

Senior Associate

Mr. Lindley is a water resources engineer with experience in creek and wetland restoration design, construction management, environmental impact/CEQA review, hydraulic design, surface and groundwater hydrology, field data collection, water quality, and remediation. His graduate studies focused on the application of analytical and numerical modeling techniques to hydraulic routing and sedimentation in wetlands, impoundments, detention basins and small sediment control structures.

Mr. Lindley combines his expertise in technical analyses and engineering design with his project management responsibilities to effectively address client needs. His technical work has included analysis and engineering design guidance in creek and wetland restoration projects, as well as hydraulic design guidance for flood control projects and environmental impact analysis for CEQA projects.

Mr. Lindley has managed design and construction of wetland restoration projects including slough channel excavation, levee breaching and lowering, levee and wind wave berm construction, installation of culverts and hydraulic structures, and re-vegetation. He has also provided construction management services for creek restoration projects including the implementation of grade control structures, toe protection, and biotechnical stream bank stabilization methods.

Additionally, Mr. Lindley has managed work efforts to collect data for physical characterization of project sites that include small and full-scale field studies for marsh and estuarine monitoring, stream monitoring, topographic and hydrographic surveying, and groundwater monitoring. Mr. Lindley also has significant experience in the design, construction and operation of soil and groundwater remediation and treatment systems.

Education

M.S., 1994 — Biosystems & Agricultural Engineering,
Oklahoma State University, Stillwater, OK

B.S., 1989 — Mechanical Engineering
University of Kentucky, Lexington, KY

Professional Registration

2004 Civil Engineer, California (License No. C 66701)

Awards

Phoenix Award for Outstanding Master's Student—First Runner-Up

Professional Societies

American Society of Agricultural Engineers

Selected Project Experience

Petaluma Marsh Restoration Project, Construction Management. Marin County, California. Provided construction management and observation services for the Petaluma Marsh Restoration Project, which entailed re-creation of a 102-acre tidal marsh on diked and subsided farmland. The restoration plan included excavation of tidal slough channels, breaching and lowering the existing perimeter levee, creation of wind-wave berms, construction of a significant new levee to protect an adjacent railroad easement, and revegetation.

Martinez Salt Marsh Restoration Project, Post-Construction Marsh Restoration Monitoring. Contra Costa County. Managed mitigation monitoring for a restored salt marsh for the California Department of Transportation. The mitigation project included removing fill, excavating a slough channel network, revegetation, and public access trails and bridges. Post-construction mitigation monitoring involves geomorphic monitoring of marshplain and slough channel development and biological monitoring of vegetation establishment and endangered species habitat development.

Selected Project Experience *(continued)*

Bahia Marsh Restoration Project, Wetland Design. Marin County. Developed wetland restoration design plans to restore both diked and filled baylands to tidal marsh. Restoration designs include grading plans, an excavated slough channel network, breaching and lowering levees, phased water level management with culvert structures, seasonal wetland enhancement, and revegetation. Project is ongoing including support for permitting and EIR processes and development of preliminary through final design drawings and specifications.

Los Capitancillos Wetland Mitigation Project, Wetland Design. San Jose, California. Conducted hydrologic and hydraulic analysis and design of freshwater mitigation wetland facility for Santa Clara Valley Water District. Provided preliminary design of grading, clean soil liner, as well as, inlet and outlet channels and structures. Analyses included water usage, percolation and seepage, rainfall-runoff, and flood routing.

Hamilton Seasonal Wetland Design Guidelines, Wetland Design. Novato, California. Developed design guidelines for seasonal wetland at the Hamilton Airfield. Provided water balance and percolation analyses related of placement of dredged materials at pilot seasonal wetland sites.

Lincoln Creek Restoration, Creek Restoration Design. Auburn, California. Developed Creek Restoration design plans for day-lighting a 500 feet reach of Lincoln Creek within the Auburn School Park Preserve for the City of Auburn. Conducted hydraulic analyses and engineering design for the restored creek to determine design sections and rock sizes that met the client's aesthetic requirements for the park and engineering design/stability requirements. Developed design drawings from conceptual level through 100% construction plans.

Sonoma Baylands Wetlands Demonstration Project, Post-Construction Marsh Restoration Monitoring. Sonoma County, California. Managed a team of surveyors and vegetation, avian, and fish scientists in the monitoring of a marsh restoration project for the U.S. Army Corps of Engineers. The Sonoma Baylands Wetlands Demonstration Project utilized dredge materials to raise the elevation of subsided farmland by several feet to approximately mean tide level to accelerate the establishment of wetland vegetation. Post-Construction Restoration Monitoring is focused on slough channel development, tidal elevation monitoring, sedimentation, bird and fish use, and vegetation establishment.

Alamo Creek Restoration Project, Construction Management. Contra Costa County, California. Provided construction management and observation services for the Alamo Creek Restoration Project which entailed re-creation of a multi-stage channel for 6,000 feet of the deeply incised main branch and channel relocation of 3,000 feet of the east branch. The restoration plan included grading, grade control, bank restoration and vegetative treatments.

Laguna de Santa Rosa, Suspended Sediment/Turbidity Monitoring. Santa Rosa, California. Monitored turbidity, water level and flow at three locations discharging into the Laguna de Santa Rosa for the U.S. Army Corps of Engineers. Turbidity was measured with optical backscatter instruments calibrated to estimate suspended sediment concentrations at each location. Suspended sediment data was utilized with flow data to estimate sediment yield into the Laguna de Santa Rosa to help determine sedimentation rates within the Laguna and to guide decisions on projects to limit sedimentation.

Selected Project Experience *(continued)*

Windemere Development, Surface Runoff Management. Contra Costa County, California. Conducted analysis and design of water quality treatment and flood control detention facilities for the Windemere Development. Developed a sediment management and monitoring plan for a wetland detention basin, collecting runoff from the Windemere Development.

Wendt Ranch Development, Surface Runoff Management. Contra Costa County, California. Conducted hydrologic and hydraulic analysis and design of water quality treatment and flood control detention facilities for the Wendt Ranch Development.

San Francisco Electric Reliability Project, Environmental Impact Review. San Francisco, California. Provided environmental review of a proposed power plant in San Francisco for the California Energy Commission. The environmental review was focused on the utilization of recycled wastewater from the City of San Francisco's combined sewer system and treated onsite for power plant evaporative cooling. In addition, the project site is located in a historic industrial area with existing subsurface impacts from previous land uses that required specific assessment and management to limit risks to onsite workers and neighboring businesses and residences. Other analyses included assessing potential flooding, erosion, and water quality impacts related to the plant's construction and operation.

Soil and Water Resource Compliance Reviews, Storm Water Pollution Prevention Plan review and implementation. Throughout California. Provided technical review of construction and operation Storm Water Pollution Prevention Plans (SWPPPs) for several power plants located throughout California on behalf of the California Energy Commission. Review of SWPPPs to determine if the SWPPPs met the requirements of Conditions of Certification specified in the Energy Commission's licensing decision and included sufficient detail and specified appropriate Best Management Practices (BMPs) to address potential erosion and water quality impacts. Site visits involved inspection of installed BMPs to verify that the measures included in the SWPPP were properly installed in preparation for the rainy season.

Blythe Energy Project - Phase II, Environmental Impact Review. Blythe, California. Provided environmental review of a proposed power plant in Blythe for the California Energy Commission. The environmental review was focused on the impacts of the proposed use of groundwater on the neighboring Colorado River. Other analyses included assessing potential flooding, erosion, and water quality impacts related to the plant's evaporation pond, retention basin, and storm water drainage channels.

Christian Nilsen, P.E.

Associate

Christian Nilsen is a registered Professional Engineer with experience in natural hydrologic systems functioning and stream/wetland restoration design. He has expertise with a variety of hydrologic and hydraulic computer models to aid in the design and prediction of restoration project performance. In addition, he has experience in flood hazard modeling, assessment, and design, including FEMA floodplain mapping and flood map revisions.

Education

M.Sc. 2005 Civil & Environmental Engineering
Stanford University, Stanford, California

B.S. 2001 Texas A&M University, College Station, Texas
Water Resources Engineering

Professional Registration

Civil Engineer, CA, # C69530

Awards

1998 – Engineering Scholars Program
2000 – Chi Epsilon, Civil Engineering Honor Society
2000 – Summer Research Grant, Texas Water Resources Institute

Selected Project Experience
(prior to PWA)

Fairfield Corporate Commons Hydrology Assessment; Solano County, 2005-2007. Project Manager. Assessed impacts of a mixed-use development on flood surface elevations in adjacent Dan Wilson Creek. Prepared a successful FEMA letter of map revision allowing for approval of a bridge vital to the region's transportation. Investigated the hydrology of onsite existing wetlands through one wet season and developed a water balance model to inform future mitigation design. Assessed stormwater management alternatives for the proposed project and designed stormwater infrastructure including various detention and infiltration basins as well as other water quality BMPs.

Jefferson-Martin Substation Wetlands Investigation; San Mateo County, 2005-2006. Project Engineer. Investigated existing seasonal wetlands and developed a hydrologic monitoring program to measure wetlands hydroperiods in a groundwater dependent system. Developed a continuous simulation water accounting model to inform design of mitigation wetlands and the potential for success. Working together with soil scientists and engineers, designed the mitigation wetlands.

Allan Witt Park Stormwater Management Plan; Solano County, 2005-2007. Project Manager. Investigated existing stormwater infrastructure at a proposed infill site and developed a hydraulic model to assess post-project capacity. Recommended and designed vegetated swales as Best Management Practices to enhance stormwater quality at the site. Developed a watershed-wide hydrologic model to study the impact that stormwater detention would have on downstream residents.

Pacific Commons Stormwater Monitoring Program; Fremont, California 2005-2007. Project Engineer. Worked on a design team for a 15-acre stormwater treatment wetland. Worked with the Regional Water Quality Control Board to develop a monitoring program for pollutant loads, and implemented an interim monitoring program to help establish baselines for future programs.

Placer County Water Systems Infrastructure Plan; Placer County, California 2001-2003. Project Engineer. Estimated future treated water demands and developed a water distribution model to evaluate how an existing water network can keep pace with rapid growth. Developed water treatment and distribution alternatives that became the basis for a long-term capital improvement program.

Dry Creek Recycled Water Groundwater Recharge Feasibility Study; Roseville, California. 2002-2004. Task Manager. Investigated the viability of a recycled water recharge program from a hydrologic and a regulatory perspective. Developed conceptual alternatives to recharge water through direct and in-lieu means and performed site investigations at potential direct recharge sites.

Landscape Architects & Planners

RESUME

CAROLYN RADISCH
Urban and Transportation Planner

EDUCATION

University of California, Berkeley,
Masters of City and Regional Planning, 1995
Masters of Civil Engineering, Transportation Engineering, 1995

California Polytechnic State University, San Luis Obispo
Bachelor of Science, 1983
Honors
California Planning Foundation Scholarship Award

PROFESSIONAL PRACTICE

EDAW
San Francisco, California
Senior Associate, 1999 to 2001

ROMA Design Group
San Francisco, California
Associate and Senior Planner, 1990 to 1998

National Transit Access Center, Institute of Urban and Regional Development, UC Berkeley
Research Associate, 1993-1995

PUBLICATIONS

"Travel Choices in Pedestrian versus Automobile-Oriented Neighborhoods," Robert Cervero and Carolyn Radisch, *Transport Policy*, Vol. 3, No. 3, 1996

Original transit and pedestrian related research and drawings included in *Transit Villages for the 21st Century*, Michael Bernick and Robert Cervero, McGraw-Hill, 1997

"Anatomy of a Transit Stop," Bonnie Fisher and Carolyn Radisch, *On the Ground*, Volume 1, No. 2 (1995)

AFFILIATIONS

American Planning Association,
Northern New England Chapter
Congress of the New Urbanism, New England Chapter

COMMUNITY SERVICE

Zoning Board of Adjustment
Hanover, New Hampshire

Board of Trustees, Montessori Children's School
Hanover, New Hampshire

OMAN ANALYTICS

Oman Analytics was founded in 1988 to provide advanced research, professional, and technical services based on computerized analysis to the environmental, engineering, and community planning and development professions.

Michael F. Oman

Mr. Oman is the principal and owner of Oman Analytics. He brings thirty years of professional planning and engineering experience to the firm including Director of Economic Development and of Land Use and Environment for the Boston metropolitan planning agency, the MAPC. He holds bachelors degrees in civil engineering and political science from the Massachusetts Institute of Technology (MIT) and a masters in Urban and Environmental Policy from Tufts University.

Mr. Oman has been a partner in Connery Associates where he developed techniques of computer land use and planning analysis and wrote and implemented plans and regulations for a number of Massachusetts communities. He left Connery Associates, with which he maintains close ties, to found Oman Analytics.

Immediately previous to reactivating Oman Analytics, he has served as Director of Transportation Planning for the Chittenden County Regional Planning Commission/Metropolitan Planning Organization. There, he was responsible for all aspects of transportation planning including the County's first full Long Range (20 year) Transportation Plan under the Federal Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) and Transportation Improvement Program (TIP) for Chittenden County, Vermont's only metropolitan county. This plan has resulted in numerous innovations in Vermont transportation planning including the first land use linked transportation demand model, a thorough understanding of congestion in the metropolitan region, a greater emphasis on maintenance of the existing transportation system and a greater emphasis on pubic transportation. Because of the unique character of Chittenden County, spanning both urban and rural communities, this work was unique in responding to both rural and urban transportation needs in a single approach.

Oman analytics emphasizes traffic and transportation oriented planning services, including comprehensive community plans, corridor and facility planning, modal planning including pedestrian and bicycle plans, transit and vehicular circulation plans, parking including innovative solutions, access management, traffic calming, site development and traffic impact analyses, and traditional neighborhood (TND) plans and context sensitive solutions/designs (CSS/CSD). Special emphasis on the relationship between transportation and land use/development.

Additional services include impact analysis, computer mapping/GIS, general community planning and zoning including master plans, growth management plans and component plans (e.g. traffic and transportation, open space), fiscal impacts analysis, zoning and other regulatory support and capital program and budget where appropriate. Oman Analytics also offers expert witness services relative to traffic and transportation matters.

RESUME OF MICHAEL F. OMAN
PO BOX 216, UNDERHILL CENTER, VERMONT 05490
PHONE: 802 899-3146 E-MAIL: OMANANALYT@AOL.COM

PROFESSIONAL EXPERIENCE

1988 – Pres **Principal, Oman Analytics, Underhill Center, VT** Community planning and Geographic Information Systems (GIS) services including traffic and transportation analysis and plans, housing planning and census analysis, open space, land use, economic development, fiscal analysis and master plans. Special emphasis on transportation/land use relationships.

1992 – 1997 **Transportation Director, Chittenden County Regional Planning Commission, Essex Junction, VT** Responsible for all aspects of transportation planning including Long Range Transportation Plan and Transportation Improvement Program (TIP) for Chittenden County, Vermont's only metropolitan county. Staff director for Metropolitan Planning Organization.

1984 – 1988 **Principal, Connery Associates, Winchester, MA** Responsible for a complete range of land use and community planning consulting, including project management and client relations, land use, economic, and environmental analysis, master planning and component plans, public participation and implementation, including zoning, subdivision and other regulations, capital facilities planning and final adoption of plans.

1979 – 1984 **Metropolitan Area Planning Council, Boston, MA Director of Land use and Environmental Planning; Director of Economic Development; Principal Planner** Provided planning services in land use, environmental protection and economic development to 101 cities and towns in metropolitan Boston. Services included groundwater protection, open space planning, downtown revitalization, industrial space planning, traffic and transportation and urban design.. Supervised a staff of six professional planners.

1978 – 1979 **Allen and Demurjian, Inc. Civil Engineers, Boston, MA Project Engineer** Site design, specifications and estimation for a variety of development projects.

1969 – 1973 **U.S. Army Corps of Engineers, Waltham, MA: Civil Engineer; Systems Programmer and Analyst** Hydrologic systems and data acquisition

EDUCATION

MA, 1975 Tufts University, Urban and Environmental Policy
SB, 1969 Massachusetts Institute of Technology, Civil Engineering
SB, 1969 Massachusetts Institute of Technology, Political Science

PROFESSIONAL AFFILIATIONS

American Planning Association
Institute of Transportation Engineers

OMAN ANALYTICS: SELECTED PROJECTS

City of Burlington, VT Comprehensive Transportation Plan (Current) With Smart Mobility, Inc and Office of Robert White, develop comprehensive transportation plan for the City, including vehicular, pedestrian and bicycle circulation, transit, and parking strategies, and projects.

Pedestrian Safety Improvement Study, City of Winooski, VT (9/05) Evaluate pedestrian access options, and safe route to school at the Winooski Education Center.

Traffic Impact of Sewer Expansion; Town of Milton, VT (for CCMPO)(8/02) Estimate likely development impact of proposed sewer extension in Milton and evaluate likely traffic impacts.

Town of St Johnsbury: Historic Main Street Partnership Study; Assessment of Historic Buildings, Site, and Parking & Wayfinding (8/01) With Vermont Design Institute, detailed parking studies and assessment of actual parking demand in downtown; parking management strategy.

City of Burlington: Redesign of Shelburne Road "Rotary" (2/02) Traffic analysis and design for replacement of non-standard and dangerous intersection at gateway to Burlington on critical Shelburne Rd (US Route 7) entrance with Robert White, Landscape Architects.

Chittenden County Metropolitan Planning Organization and Northwest Regional Planning Commission: US Route 7 Corridor Management Plan Winooski to Georgia (9/01) In collaboration with Kathleen Ryan, Landscape Architect, developed comprehensive corridor management strategy and plan that addresses roadway, pedestrian and streetscape, and extensive public transportation improvements, and development strategies that will enhance both transportation and community life.

Addison County Regional Planning Commission and Town of Middlebury; Middlebury/US Route 7 Corridor Management Plan (11/98) In collaboration with Kathleen Ryan, Landscape Architect, and Community Planning and Design, developed a comprehensive corridor management plan consisting of roadway, pedestrian and streetscape improvements and potential development controls that provide realistic solutions in this difficult corridor.

Village of Essex Junction: Traffic Impact Analysis for Whitcomb Farm Developmet. (8/98) Retained by Town to provide an unbiased analysis of the traffic impact associated with large residential development project.

Traffic Calming and Alternative Transportation for Five Addison County Towns, 9/97 Addison County Regional Planning Commission, 9/97 In collaboration with Kathleen Ryan, Landscape Architect, developed traffic calming plans for six villages in Addison county heavily impacted by through arterial traffic.

Chittenden County Long Range Transportation Plan, Chittenden County Metropolitan Planning Organization (MPO), 1996 As Transportation Director, developed the County's first full Long Range Transportation Plan under the Federal Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) providing for the investment of approximately $400M of transportation improvements over the next twenty years and addressed all modes in Vermont's only urban metropolitan area.

Appendix I

- July 2005 Smart Mobility Report

Smart Mobility, Inc.
16 Beaver Meadow Road
Aldrich House #3
P.O. Box 750
Norwich, VT 05055
(802) 649-5422
www.smartmobility.com

A Practical, Cost Effective, and Environmentally Superior Alternative to the Foothills South Toll Road for the South Orange County Transportation Infrastructure Improvement Project

Prepared By:

Norman L. Marshall

Prepared for the California State Parks Foundation

July, 2005

Summary

The Transportation Corridor Agencies (TCA) present voluminous traffic modeling and analysis attempting to show that a new toll corridor is necessary to accommodate future traffic needs in South Orange County.[1] But a close look at the numbers and analysis presented show that a refined series of arterial and I-5 improvements could practically and cost-effectively meet future traffic demand without sacrificing irreplaceable natural resources.

TCA rejected a similar alternative (the Arterial Improvements Plus or "AIP" alternative) from full consideration in the DEIS/SEIR because of purported high displacement impacts and associated costs. Notably, these purported displacements and costs were not supported by any description of methodology and assumptions, either in the DEIS/SEIR or in its underlying technical reports. This critical gap precludes assessment of whether these costs are real. Moreover, displacement impacts for roadway projects can often be reduced or eliminated through design refinements, such as re-striping, widening on one side where no displacement would result and moving the centerline, not widening at all on sections where projected demand is low, *The TCA never engaged in any effort to refine the design of the AIP alternative to avoid displacement.*

In fact, a refined version of the AIP alternative, which includes limited I-5 widening and arterial improvements, could provide superior traffic benefits—and minimize or eliminate displacement impacts and costs—completely avoiding the heavy environmental cost of building a new toll road through south Orange County parks and ecological reserves. Moreover, if this refined alternative included High Occupancy Toll (HOT) lanes instead of High Occupancy Vehicle (HOV) lanes on the I-5 assumed in the AIP alternative, an important source of new revenue would be created to help fund the project while maximizing efficiency.

This refined scenario represents a balanced approach, combining the addition of one HOV or HOT lane on high-demand segments of I-5 with a set of arterial improvements similar to those tested in the AIO (Arterial Improvements Only) alternative of the DEIR/DEIS. The arterial improvements might include expanding of Antonio Parkway/Avenida La Pata to an eight-lane smart street from Oso Parkway to San Juan Creek Road and to a six-lane smart street from San Juan Creek Road to Avenida Pico, and other improvements, accomplished so as to avoid displacement impacts.

[1] *Environmental Impact Statement/Subsequent Environmental Impact Report and Draft Section 4(f) Evaluation for the South Orange County Infrastructure Improvement Project* (DEIS/SEIR) and the associated *Traffic and Circulation Technical Report* (TCTR)

Traffic Performance

The traffic performance of a combined arterial/I-5 approach such as the AIP alternative compares favorably with *any* of the toll road corridor alternatives proposed by TCA, whether the performance metric is reducing future *Interstate 5* congestion, reducing vehicle delay on the arterial system, or reducing total vehicle hours of travel.

Metric 1: Reduction of Future I-5 Congestion

The Traffic Technical Report summarizes projected 2025 congestion on I-5 in terms of Percent of Daily I-5 VMT [vehicle miles traveled] in the Study Area Under Congested Conditions. For the No Action alternative, the statistic [percentage increase?] is 16.9%. The values for the 11 new toll road alternatives range from 2.4% - 15.2%. *The AIP alternative outperforms all the new toll road alternatives, with only 2.2% of daily I-5 VMT operating under congested conditions in 2025.*

Metric 2: Vehicle Delay on Arterials

The Traffic Report summarizes year 2025 arterial roadway congestion in terms of *Vehicle Delay on the Arterial System.* For the No Action alternative, the number is 9,944 **hours of delay during the morning and afternoon peak traffic periods** . The values for the 11 new toll road alternatives range from 7,677 to 8,708. *Again the AIP alternative outperforms all toll road alternatives, with a value of 7,589.*

Metric 3: Total Vehicle Hours Traveled

Finally, the Traffic Report analyzes total vehicle hours of travel (VHT) for the modeled area of impact. Compared to the No Action alternative, the 11 toll road alternatives reduce VHT by 0.01% to 0.16%. The combined scenario is shown as reducing VHT by a comparable 0.08%.

It is critical to bear in mind that even under TCA's flawed approach to traffic modeling, the combined alternative under-performs the best performing toll road alternative by only a *small fraction of one percent.* In reaching these numbers, TCA declined to employ universally accepted modeling procedures that take into account the effects of congestion on trip distribution by using "feedback loops" to provide a far more accurate projection of traffic impacts – despite TCA's acknowledgement that such modeling would reduce the traffic benefits of the toll road alternatives relative to the other alternatives. TCA's stated rationale for this decision was that the more accurate modeling would likely have shown a relative improvement in the performance of the AIP of *up to one percent* – a difference it described as "relatively minor." (Traffic and Circulation Technical Report "TCTR", p. 1-10) But even a one percent difference *is over ten* times the difference between the best performing alternative and the AIP using TCA's own calculations.

The TCA's conclusion that a toll road corridor alternative will most effectively reduce Vehicle Hours Traveled is therefore undermined by *the TCA's own methodology and assumptions.* Indeed, more accurate modeling using standard feedback loop procedures would likely show that a combined alternative would *outperform* the toll toad alternatives in VHT reduction.

Displacement Impacts and Costs

The DEIS/SEIR rejects a combined alternative as infeasible based on "project costs" and because it purportedly "displaces 898 residences." (DEIS/SEIR, ES-16) The costs are in large part due to the purported displacements, so the estimate of displaced residences is critical to the feasibility determination. *The*

DEIS/SEIR fails to document, however, how the displacements were estimated. A technical report entitled Draft Relocation Impacts Technical Report: Final (December 2003) states the properties were counted if they fell within "limits of disturbance." While there are some definitions as to when properties are considered disturbed, no information is given as to how the area of disturbance was calculated along existing roadways. Since the AIP alternative would generally require a mere 13-foot widening on each side of I-5, the estimated displacements appear on their face to be unrealistically high.

In any event, TCA failed to take into consideration how even minor refinements to the design of the AIP might greatly reduce or even eliminate these impacts and costs. These include refinements such as re-striping, widening on one side and moving the centerline, or not widening at all on sections of the I-5 and selected arterials where projected future traffic demand is low. Such a refinement process is critical when working within the constraints of the built environment. Simply laying down a wide buffer of potential impacts and counting properties touched does not represent a serious consideration of non-toll road alternatives.

This refusal to refine the AIP or other non-toll road alternatives markedly contrasts with the numerous variations of a toll road alternative considered in the DEIR/DEIS that were developed to reduce negative impacts such as displacement. The AIP alternative should have similarly been refined to identify the design capable of providing maximum benefits while minimizing displacements and costs.

Refinements might include no widening of the I-5 along segments modeled as uncongested assuming implementation of the arterial improvements. Where I-5 lanes need to be added, the centerline could be shifted slightly so that widening impacts only one side of the road where needed to avoid or minimize displacement impacts. Similarly, alternative alignments and re-striping could avoid or minimize displacement for the arterial widening. By avoiding displacement impacts, these modifications are likely to be cost effective. The documentation reflects that none of these obvious refinements were considered.

Conversion to HOT lanes should also be seriously considered. HOT lanes have been very successful on SR-91 in Orange County and I-15 in San Diego County. The San Diego Association of Governments has HOT lanes on I-5 in San Diego County in its adopted long-range transportation plan. Since South Orange County is the bridge between the greater Los Angeles and San Diego regions, an unbroken set of HOT lanes would encourage higher vehicle occupancy rates. These higher vehicle occupancy rates would reduce traffic volumes not only on I-5 but also on arterials and local roads used to access I-5. The HOT lanes also would provide an important source of new revenue.

In sum, a toll-road corridor alternative is demonstrably not necessary to meet future traffic goals. Indeed, a balanced set of arterial and HOV/HOT lane improvements on the I-5 will likely provide superior traffic benefits. Purportedly prohibitive economic and displacement costs can be reduced or eliminated through refinements, an exercise that TCA inexplicably failed to undertake. This exercise must proceed, and further independent analysis performed, before demonstrably well-performing I-5 widening alternatives can be rejected on economic grounds.

The Combined Alternative/AIP Alternative Analysis in DEIS/SEIR

The DEIS/SEIR models an I-5 scenario that includes adding 1 general purpose lane and 1 HOV lane in each direction throughout most of the study corridor. This would be costly and could have significant impact on adjoining property owners. In contrast, the combined scenario adds only a single lane (HOV) in each direction. This would be much less costly and have much less impact on adjacent property owners.

The combined scenario represents a balanced approach, combining limited capacity expansion on I-5 with arterial improvements. I-5 improvements include: "the addition of spot mixed-flow auxiliary lanes south of Ortega Highway and south of Avenida Pico, and the reconstruction of several existing I-5 interchanges." (TCTR, p. 2-23) The arterial improvements in the combined scenario are the same as those in the AIO alternative described in the DEIS/DEIR. Specifically, they include:

> *... the expansion of Antonio Parkway/Avenida La Pata to an eight lane smart street from Oso Parkway to San Juan Creek Road and to a six-lane smart street from San Juan Creek Road to Avenida Pico. In addition, Smart street technologies would also be included on Ortega Highway between Antonio Parkway/Avenida La Pata and I-5, Camino Las Ramblas between Avenida La Pata and I-5, and Avenida Pico between Avenida La Pata and I-5. Smart street technologies include a combination of advanced traffic management strategies such as traffic signal coordination, real time monitoring and surveillance, and traveler information, as well as modest physical improvements such as additional turn lanes at intersections. The effectiveness of providing grade separation at the intersections of Antonio Parkway/Oso Parkway, Antonio Parkway/Crown Valley Parkway, Antonio Parkway-La Pata Avenue/Ortega Highway, and Avenida La Pata/Avenida Pico will also be considered in the evaluation of the AIO Alternative. (TCTR, p. 2-19, 2-23)*

The combined approach, in the form of the AIP alternative, is rejected from full consideration in the DEIS/SEIR for the reasons given in the paragraph below.

> *Arterial Improvements Plus HOV and Spot Mixed-Flow Lanes on I-5 (AIP) Alternative. The AIP Alternative performed poorly in project costs and in cost per hour of travel time saved; well for traffic operating in congestion on I-5; moderately for hours of travel times savings; well in impacts to riparian ecosystems, CSS and gnatcatchers; and it displaces 898 residences. Based on the very poor performance of this Alternative related to project costs and socioeconomics, the Collaborative agreed to eliminate the AIP Alternative from consideration in the EIS/SEIR. (DEIS/SEIR, p. ES 16)*

As this paragraph indicates, the rejection of this alternative was based entirely on "costs and socioeconomics." TCA concedes that the combined scenario performs "well" for I-5 congestion, impacts to riparian ecosystems, CSS and gnatcatchers. It is also listed as "moderate" for "hours of travel time savings" but it actually performs excellently, as I explain below. The only negative factor identified by TCA – the purported displacement and related costs -- are unsupported by any evidence in the record that has been made available to the public. More importantly, any displacement that would be caused under the configuration modeled might be drastically reduced or eliminated through feasible refinements, none of which were considered by TCA.

Future I-5 Congestion

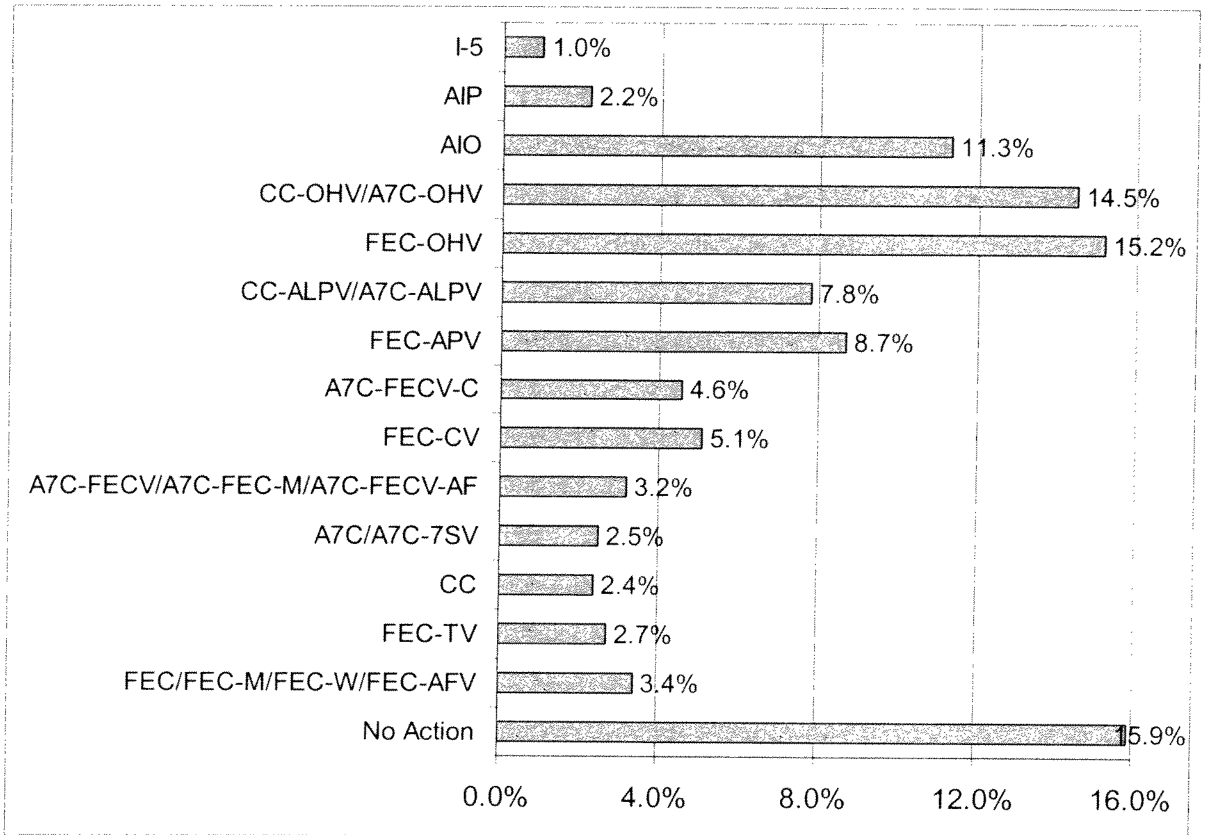
Reducing future congestion on I-5 is one of the critical goals of the South Orange County Transportation Infrastructure Improvement Project. The DEIS/SEIR analysis shows that construction of a new toll road is less effective in reducing future congestion on I-5 than are improvements on I-5 itself.

> *As shown in Table 4-42, the I-5 and AIP Alternatives generally have less congestion on I-5 than the other Build Alternatives. This is because both of these Alternatives include improvements to I-5, where substantial*

congestion occurs under both existing conditions and future No Action Alternative conditions. (TCTR, p. 4-121)

As shown below, the two I-5 improvement alternatives ("I-5" and "AIP") outperform all eleven toll road alternatives on this performance measure.

DEIS/SEIR Modeled Percent of Daily I-5 VMT in Study Area under Congested Conditions



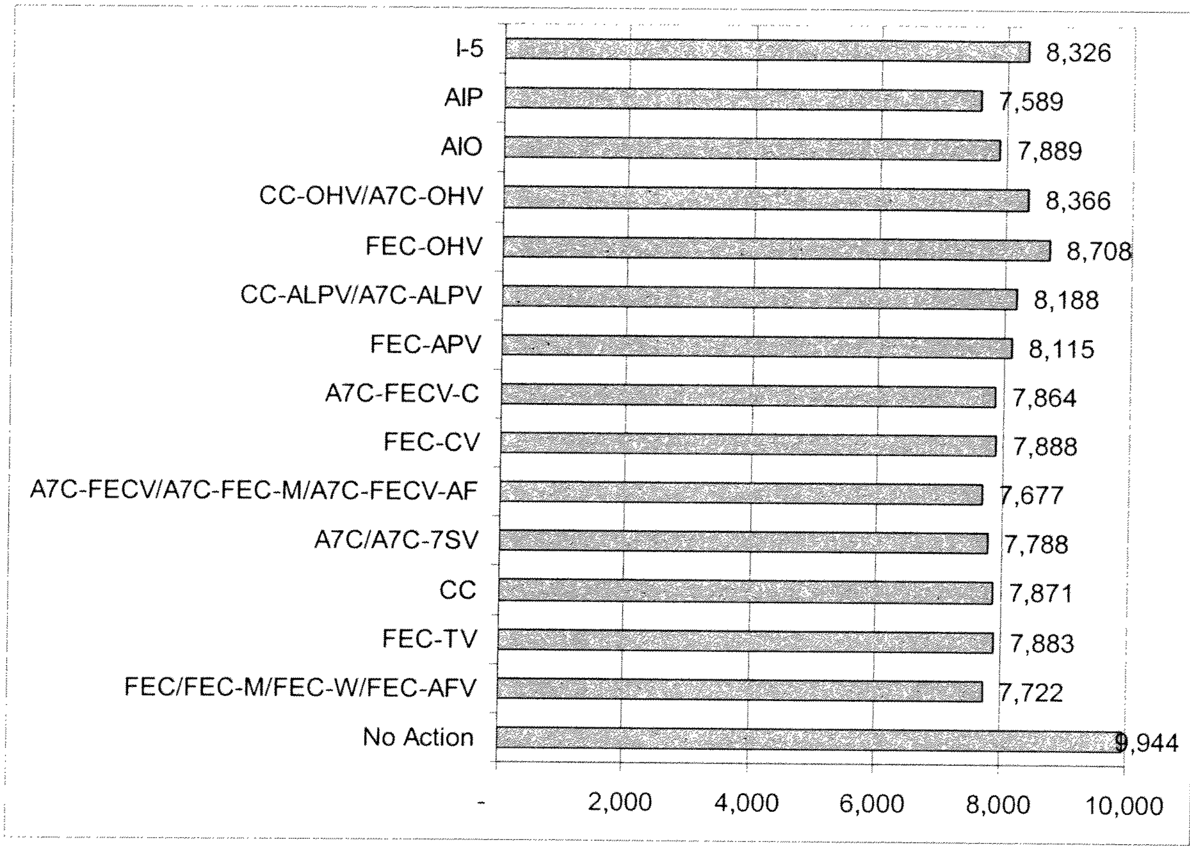
Source: Scenario 3[2], TCTR, Table 4-42.

Arterial Congestion

Table 4-43 of the Traffic and Circulation Report sums the daily peak period intersection delays for a common set of intersections. For both Scenarios 3 and 4 (the only ones where alternative AIP was modeled), the AIP alternative performs the best of all alternatives. The delay totals are shown below for Scenario 3.

[2] Results for Scenario 3 are used throughout this report as this scenario was modeled for all alternatives and provides for comparison. Scenario 3 includes the buildout circulation system and the RMV plan.

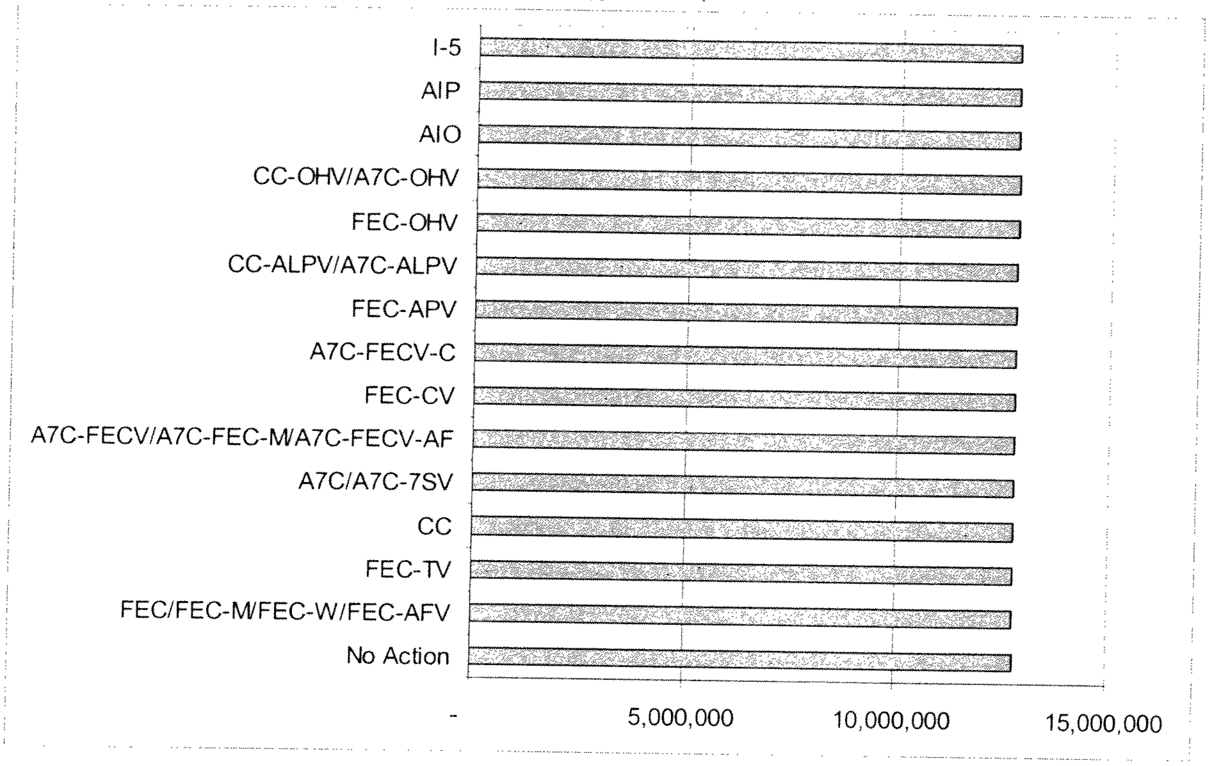
Summary of 2025 Vehicle Delay on the Arterial System (from Table 4-43 of TCTR)



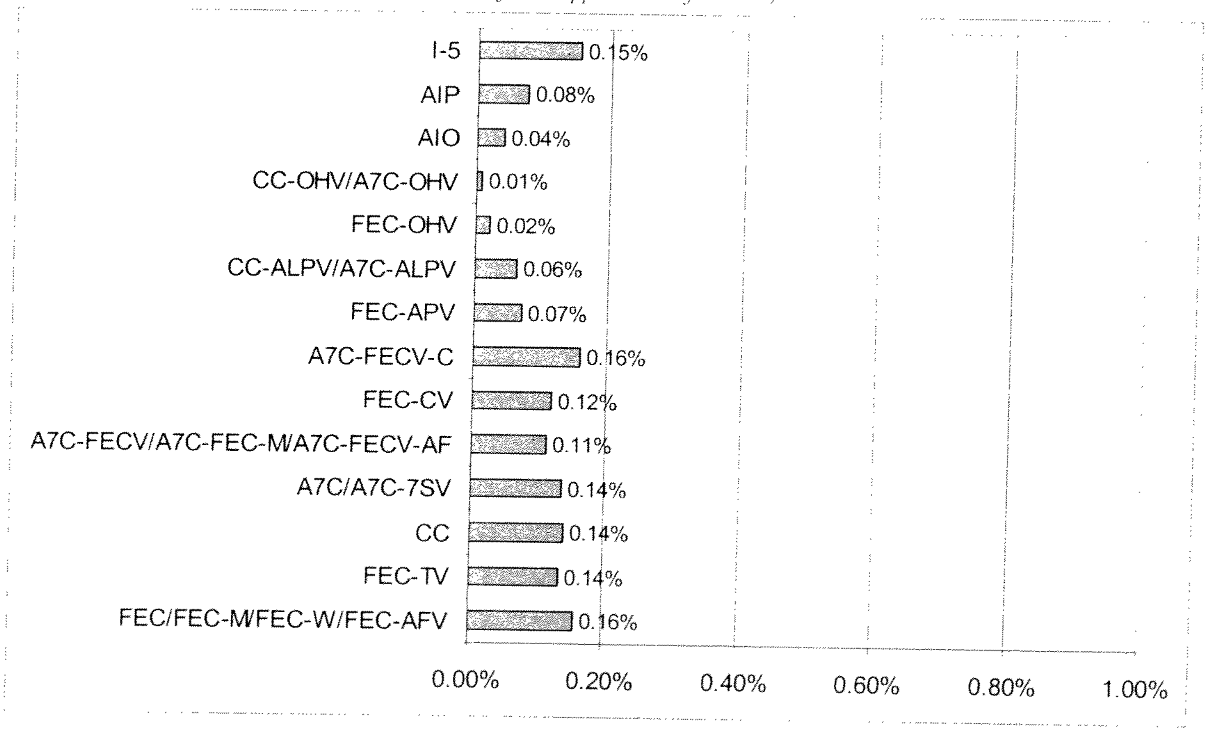
Total Vehicle Hours of Travel (VHT)

The TCTR Appendix B reports total vehicle hours of travel (VHT) for the modeled area. The following two figures summarize the results for Scenario 3. First, all of the totals are shown to illustrate how small the differences are. (The range of differences is only 0.16%.) Then the differences are shown on a scale that allows comparison.

Summary of 2025 Vehicle Hours of Travel - VHT (from Appendix B of TCTR)



VHT Reductions from 2025 No Action Scenario (from Appendix B of TCTR)



Compared to the No Action alternative, the 11 toll road alternatives reduce VHT by 0.01 to 0.16%. (Note these values all are much less than 1 percent.) The AIP scenario is shown as reducing VHT by 0.08% which puts it in the middle of the pack under TCA's modeling.

However, this is not the entire story. The DEIS/SEIR modeling used procedures that show greater benefits for the toll road alternatives than would be shown using commonly employed procedures that feed back congested travel times into the trip distribution step of the modeling exercise. The use of a feedback loop is widely recognized among traffic professionals as necessary to account for changes in individuals' transportation choices as a result of increased congestion on certain roadways. TCA justified its failure to incorporate this added step by saying that the resulting difference would be "relatively minor . . . less than one percent of the VMT or VHT forecast in southern Orange County." (TCTR, p. 1-10)

But this so-called "minor" difference of one percent is more than five times the apparent benefit of the best performing alternative, and over ten times the difference between the best performing alternative and the AIP alternative. The DEIS/DEIR's comparison of the various alternatives to the one-tenth of a percent using VHT reduction as a metric is therefore meaningless. Indeed, it is likely that the AIP alternative would outperform the toll toad alternatives in VHT reduction if proper modeling procedures were used.[3]

Modeling methodology is critical. The TCTR states:

> *The SCSAM follows nationally accepted "best practices" in the engineering profession. Such models are capable of forecasting induced travel demand that may occur when accessibility is improved in a transportation corridor due to circulation system improvements in that corridor. In a travel demand model, such induced travel is accounted for through differences in trip distribution, mode choice and route choice between transportation alternatives (demonstrating differences in trip generation due to transportation alternatives is difficult to assess without an integrated land use/transportation model). This is typically accomplished using "feedback loops" in which congested roadway speeds from a traffic assignment are looped back to the trip distribution and mode choice components of the travel demand model. This feedback process is sometimes referred to as "speed recycling" because it uses an iterative procedure to derive congested speeds for use in determining trip distribution and mode choice. (p. 1-9)*

We agree with TCA's consultant that "best practices" include feeding back congested travel times to trip distribution. Model feedback has been required by Federal air quality modeling regulations for conformity determinations since 1993 and this provision was reaffirmed after public comment in 1997 as discussed below.

> *The final rule's fifth network modeling requirement is based on Sec. 51.452(b)(1)(iv)/Sec. 93.130(b)(1)(iv) of the November 1993 conformity rule, which requires feedback of travel times resulting from traffic assignment to travel times used in trip distribution. Although this requirement was not proposed as part of option 3, EPA received comments based on proposed option 2 that this requirement of the original rule should be retained. Commenters pointed out that this type of consistency in the evaluation of travel time is almost universally recognized to be scientifically valid. A commenter stated that not requiring feedback would allow analyses to be manipulated to produce desired results. Another commenter stated that most MPOs have already implemented full feedback, and it is easy to perform and more accurate than partial feedback. Commenters submitted technical reports and papers to the docket in order to document their claims that full feedback is recognized to be a necessary and sound modeling improvement.*

[3] The TCTR reports that the AIP alternative reduces systemwide vehicle miles of travel (VMT) compared with the No Action alternative. All new toll road alternatives are reported to increase VMT over the No Action alternative. (Table 4-41, p. 4-113 – 4-115. VMT is highly correlated with air emissions and energy use.

> *EPA agrees with commenters that there is clear theoretical justification for feedback between traffic assignment and trip distribution, and that feedback may be essential to accurate forecasts when congestion exists. In addition, EPA agrees that full feedback is already widely available and used. As a result, EPA believes it is appropriate to retain the feedback requirement. (Federal Register: August 15, 1997, Volume 62, Number 158, Page 43779-43818, Transportation Conformity Rule Amendments: Flexibility and Streamlining)*

The DEIS/SEIR inappropriately relies on traffic forecasts made without feedback even though the modelers were aware of the issue and even did sensitivity analyses to investigate the issue. It was determined that:

> *The OCTAM and SCSAM results indicated that the magnitude of improvement provided by the SOCTIIP Build Alternatives, (for example, in terms of traffic relief on I-5 and area-wide reduction in VHT), is somewhat less when using different trip distributions based on feedback loops rather than a static trip distribution. (TCTR, p. 1-10.)*

Modeling with feedback is proper, and modeling without feedback is improper. The TCTR admits that modeling with feedback shows less benefit for the build alternatives than presented in the DEIS/SEIR. Using the modeling results without feedback simply does not provide an accurate basis for comparison of the alternatives.

That the purported differences in the projections that would be obtained using feedback loops would be "no more than one percent of the peak hour or ADT volumes forecast on I-5," does not excuse TCA's decision to ignore those differences, given the much smaller differences in performance between the alternatives. (TRTC p. 1-10). Even a one percent difference is *ten times* the shortfall in VHT reduction performance between the AIP [combined] alternative and the *best* performing corridor alternative. Elsewhere in the DEIR/DEIS and TRTC, TCA finds these much smaller differences between the alternatives to be highly significant, dividing the alternatives into three sets of ranked groups (TCTR, p. 4-112). TCA cannot credibly assert, as it has, that *one percent* of VHT reduction is *in*significant while *one tenth* of one percent is significant.

Displacement Impacts and Costs

The DEIS/SEIR rejects the AIP alternative from full consideration based on "project costs" and because it "displaces 898 residences." (DEIS/SEIR, ES-16) The costs are largely based on the displacements, so the estimate of displacements is critical to TCA's finding of infeasibility. Yet, the DEIS/SEIR fails to document how the displacements are estimated. There is a report entitled *Draft Relocation Impacts Technical Report: Final*, prepared by P&D Consultants, Inc. and dated December 2003. This report describes how properties were counted if they fell within "limits of disturbance." While there are some definitions as to when properties are considered disturbed, no information is given as to how the area of disturbance was calculated along existing roadways. As the AIP alternative would generally add only one 13-foot lane to each side of I-5, the estimated displacements appear to be unrealistically high.

Refined Combined Alternative

The DEIS/SEIR considers many refinements of the toll road alternative concept--with some alternatives having been developed during the process to build on benefits and reduce negative aspects of earlier alternatives. The TCA utterly fails to undertake a similar refinement process concerning I-5 widening alternatives such as the AIP alternative. Such a refinement process is essential when working within the constraints of the built environment. Simply laying down a wide buffer of potential impacts and counting properties touched does not represent a proper planning process.

The AIP alternative should be refined to maximize benefits and minimize or eliminate displacements and costs. Refinements could include reducing the need for widening I-5 along the entire length, since some segments of I-5 are modeled as uncongested if the arterial improvements in the AIO alternative are built. In other segments of I-5 where a lane might be added, shifting the center line slightly so that there are 26 feet of impact to one side of the road rather than 13 feet of impact to both sides of the road might eliminate potential displacements.

The same holds true for any necessary arterial widening. These need to be reviewed where there are significant impacts. TCA has made no attempt to determine whether lesser widening is possible for certain impacted segments, or whether it would be more cost effective to do the widening on one side rather than both sides for other segments.

Conversion to HOT lanes on the I-5 should also be seriously considered. HOT lanes have been very successful on SR-91 in Orange County and I-15 in San Diego County. The San Diego Association of Governments has HOT lanes on I-5 in San Diego County in its adopted long-range transportation plan. South Orange County is the bridge between the greater Los Angeles and San Diego regions, and an unbroken set of HOT lanes would encourage higher vehicle occupancy rates. These higher vehicle occupancy rates would reduce traffic volumes on I-5 but also on arterials and local roads used to access I-5. The HOT lanes also could provide an important source of new revenue.

TCA has not seriously investigated the potential for a refined alternative combining limited I-5 and arterial improvements to solve future traffic problems in a cost-effective way, and instead has focused almost exclusively on toll road corridor alternatives with far greater environmental effects. TCA rejected this alternative based on purported displacement effects that have not been documented, and that in any event could potentially be avoided by obvious design measures never considered by TCA. Available data, including the studies generated by the TCA itself, offer convincing evidence of the potential of a combined alternative to reduce traffic congestion in the County as well or better than the toll-road alternatives.

Appendix 2

- Runoff Management Plan

smart mobility

PWA
ENVIRONMENTAL HYDROLOGY

MEMORANDUM

Date:	September 5, 2007
To:	Michael Fitts
Organization:	Endangered Habitats League
From:	Mark Lindley, P.E. and Christian Nilsen, P.E.
PWA Project:	I-5 Widening Runoff Management Plan (1881.01)
Subject:	Conceptual Runoff Management Plan for the I-5 AIP-R Alternative
Copy(ies) To:	Lucy Gibson – SmartMobility

Executive Summary
A conceptual level Runoff Management Plan has been developed for the AIP-R alternative that has been developed that reduces impact to developed areas by locating detention basins in undeveloped areas. The methods and criteria used to develop the AIP-R Runoff Management Plan were similar to those used to develop the runoff management plan proposed for the SOCTIIP AIP to aid in comparison between the SOCTIIP AIP alternative and the proposed AIP-R. The proposed AIP-R Runoff Management Plan would provide similar or improved water quality treatment as compared to the SOCTIIP AIP alternative by proposing larger detention facilities, additional vegetated swales, and pretreatment. In addition, the proposed AIP-R Runoff Management Plan is extended south including an additional detention facility that provides treatment of runoff discharged into San Mateo Creek that would not be treated under the SOCTIIP AIP alternative.

AIP-R Alternative – Runoff Management Plan
A Runoff Management Plan (SOCTIIP RMP, PSOMAS, 2003) was developed for the original AIP alternative in the SOCTIIP EIR. The SOCTIIP RMP and provides the basis for stormwater treatment best management practices (BMPs) sizing and location as an appendix to the larger SOCTIIP EIR. The SOCTIIP RMP outlined conceptual level design of stormwater BMPs for the AIP alternative. The SOCTIIP RMP identified 28 extended detention basins (EDBs) to treat stormwater runoff generated along the portion of Interstate Highway 5 (I-5) widened in the AIP alternative. In general, these EDBs were located at low points adjacent to the proposed highway alignment. While the proposed locations are sense hydraulically appropriate, in several cases, they would result in displacements of existing homes and businesses along the I-5 corridor.

Based on the above review and concern over potential impacts, PWA has developed a conceptual level Runoff Management Plan for the AIP-R Alternative that would to provide comparable or improved stormwater treatment with fewer property displacements as compared to the AIP Alternative. Similar to the SOCTIIP RMP, this RMP is presented at conceptual level. To develop the AIP-R RMP, regulatory standards from Orange County, the San Diego Regional Water Quality Control Board, and Caltrans were reviewed verify the runoff management and stormwater quality requirements for the implementation of the AIP-R Alternative. The proposed AIP-R RMP uses the same approach presented in the SOCTIIP RMP to conceptually size the EDBs to manage runoff for the proposed I-5 widening project and the existing highway included in the AIP-R Alternative. The AIP-R RMP includes treatment of runoff from the existing highway, which is not currently routed through treatment BMPs.

Building upon the SOCTIIP RMP, we have identified alternative locations for several BMPs including EDBs and vegetated swales to reduce property displacements while meeting stormwater treatment standards. Areas that appeared to be unused open space or vacant lots along the existing freeway were identified as possible for BMP sites. Alternatively, BMPs were located in existing agricultural fields or parking lots to limit displacement of existing structures. Underground detention is possible for EDBs in areas with existing parking lots to maintain current parking capacity where necessary. Where possible, the EDB areas were expanded to decrease treatment depths to improve water quality treatment and increase infiltration and evaporation to help meet hydrograph modification requirements. Several areas were also identified that could be utilized for vegetated swales to provide water quality treatment and increase infiltration and evaporation while conveying runoff along the highway.

In addition, the AIP-R RMP was extended south of San Mateo Creek (beyond the limit of the widening of I-5 proposed in the AIP-R) to treat runoff generated along I-5 that is currently discharged into San Mateo Creek. This runoff that would not be treated under the SOCTIIP AIP alternative, would be treated in a proposed detention facility located just south of San Mateo Creek. Thus, the AIP-R RMP would offer improved water quality treatment for all I-5 runoff that is discharged into San Mateo Creek.

Regulatory Background

The AIP-R Conceptual Runoff Management Plan is intended to meet the requirements for stormwater runoff water quality treatment and peak flow mitigation set forth by the San Diego Regional Water Quality Control Board, Orange County, and Caltrans. Orange County requires projects like the AIP-R Alternative to mitigate for increases in peak discharge rates to below pre-project conditions for up to a 25-year design storm. The National Pollutant Discharge Elimination System (NPDES) administered through the San Diego Regional Water Quality Control Board (RWQCB) requires municipalities to obtain permits for stormwater discharges and a major component is to ensure that stormwater runoff is treated through appropriate BMPs. The San Diego RWQCB and Orange County are also in the process of developing requirements related to hydrograph modification, which will apply to the AIP-R Alternative if it is ultimately implemented. For stormwater discharges into natural channels, hydrograph modification regulations are expected to require that peak flows, runoff volumes, and durations must be controlled to below pre-project conditions for small frequent storms.

The existing I-5 highway was constructed prior to the adoption of the current flood control and stormwater quality regulations, and, as a result, stormwater runoff from the existing highway is not treated to current standards. Since the AIP-R Alternative involves a major retrofit of the existing I-5 highway, the entire affected segment of the highway will need to be updated to meet current stormwater regulations including peak flow mitigation for flood control, water quality treatment, and ultimately hydrograph modification requirements relative to pre-project (pre I-5) conditions. Therefore, the proposed AIP-R RMP assumes that the project must address runoff from the 100% of the proposed I-5 corridor including the existing highway and the proposed improvements.

Recommended Best Management Practices

The RWQCB recognizes a number of BMPs for the treatment of stormwater runoff including detention basins, vegetated swales, constructed wetlands, and infiltration basins. The California Stormwater Quality Association (CASQA) provides standard design guidance for BMPs in the State of California.

The primary BMPs proposed in the AIP-R RMP are extended detention basins (EDBs). EDBs are stormwater detention facilities that detain runoff controlling discharge rates and allowing infiltration following storms. Runoff detained in EDBs is completely discharged through an outlet structure and via infiltration to the subsurface and evaporation allowing the basin to dry out between storms and during the dry summer months. EDBs remove stormwater pollutants through a variety of mechanisms including adsorption, settling and biological uptake. The other primary benefit of using EDBs is that the same basin can be used for pollutant removal, hydrograph modification management, and stormwater detention.

Several areas adjacent to the existing highway corridor that could be converted to support vegetated swales to provide water quality treatment have also been identified. Vegetated swales are drainage channels with a wide flat bottom designed to convey runoff from small frequent storms with shallow flow depths relying on the filtering effects of the grass vegetation to improve water quality. Vegetated swales remove stormwater pollutants through adsorption, settling, and biological uptake. By spreading flow over a wider area, vegetated swales also promote infiltration, evaporation, and evapo-transpiration as well as reduce flow velocities which help meet hydrograph modification requirements. Vegetated swales are not sized or assessed in detail in this conceptual RMP; rather the swales are proposed as BMPs that could be utilized in addition to the EDBs to further improve water quality and increase infiltration while conveying stormwater runoff to EDBs.

The SOCTIIP RMP includes a subsurface stormdrain system to convey stormwater runoff to the proposed EDBs. In general, the AIP-R RMP proposes a similar stormdrain system except in areas with proposed vegetated swales. Runoff from the widened I-5 corridor is anticipated to flush litter, hydrocarbons, oil, grease, and heavy metal based pollutants from the highway surface. The proposed EDBs and vegetated swales would be able to infiltrate a portion of the runoff volume to help meet hydrograph modification requirements. Infiltration of runoff impacted by pollutants from the highway corridor could lead to impacts to groundwater quality. To help address these pollutants, we propose the use of oil-water separators and/or vortex type pretreatment devices to remove hydrocarbons, sediment, and floating debris from runoff prior to discharge into the proposed EDBs to minimize potential groundwater quality impacts related to infiltration of polluted stormwater. Oil-water separators and vortex devices can be located within the stormdrain system near the outfall to each EDB and vegetated swale. While these devices will add some upfront costs to implementation of the AIP-R RMP, they will result in improved water quality and ultimately will streamline maintenance activities by providing a central location to collect hydrocarbons, sediment, metals, and debris.

Extended Detention Basin - Design Basis

The SOCTIIP RMP for the AIP alternative provides an explanation of the sizing and placement of each extended detention basin. Using the proposed layout for the AIP alternative, the SOCTIIP RMP divides the project into 16 contributing areas separated by high points along the highway and appropriately sized EDBs within each area. Areas required for EDBs range from 0.2 acres to 2.3 acres with depths between 4 and 5 feet. For our analysis, we followed the same general approach and used the same criteria except that the basin siting was modified to avoid developed parcels. A detailed review and critique or enhancement of methods was beyond the scope of our work. In summary, the following design criteria are the same in both analyses:

- Using profile grading sheets, high and low points for the AIP alternative were identified, which determine the watershed areas for each extended detention basin(s).
- Basins are generally located at low-points along the highway and usually correspond to existing discharge points for highway runoff.
- Using a volume-based approach, the water quality volume corresponding to the 85th percentile annual storm event is calculated. For Orange County, water quality volume has an equivalent depth of 0.8 inches (2 cm). Assuming 100 percent impervious area, the water quality volume is the product of the contributing area and 0.8 inches (based on 85th percentile storm depth, i.e. treating the first 0.8 inches of rainfall in each event provides treatment of 85 percent of average annual runoff).
- For water quality treatment, basins are generally assumed to require a depth of four to five feet depending upon the basin and location, which are within the CASQA guidelines for water quality treatment depth in an extended detention basin. The water quality treatment area required for each basin is the water quality treatment volume divided by the basin depth. Where possible, proposed basins were expanded in the AIP-R RMP to decrease the depth required for water quality treatment to improve treatment efficiency and increase infiltration and evaporation. CASQA guidelines indicate that extended detention basins should detain the water quality volume over a 48- to 72-hour draw down period.
- Preliminary EDB designs are sized for additional detention, in excess of the WQV, to provide additional space required for mitigation of hydrologic, erosion, and sedimentation impacts in the local drainage channels. The area required for water quality treatment was doubled to calculate the required basin area. (SOCTIIP RMP, 2003). While the basis for this step is not clear, it is considered conservative in that discharge would be reduced with infiltration and evaporation increased. This may or may not be the appropriate approach for a developed area depending upon existing land uses in the vicinity of the basins. Further analysis and more formal evaluation of design criteria could result in a reduction of the basin areas.
- To account for area necessary for grading requirements, a 10-meter buffer (32.8 feet) was applied around each extended detention basin. This buffer (beyond the required area for each basin is meant to account for both a grading slope requirement and additional area needed for eminence access.

Recommendations for the AIP-R Runoff Management Plan

The proposed AIP-R RMP includes 30 EDBs and identifies 5 locations for vegetated swales to treat runoff from the existing freeway including the widening proposed in the AIP-R Alternative. The proposed locations for the EDBs and vegetated swales are shown on Figures 1 through 9 and on the detailed interchange plans. Table 1 provided in Appendix A presents detailed sizing calculations for the EDBs including contributing watershed areas, water quality volumes, basin depths, and areas based on the methods presented in the SOCTIIP RMP. The EDBs with asterisks in Table 1 represent EDBs that were revised as compared to the SOCTIIP RMP. A brief bullet list review of each EDB recommended in the SOCTIIP RMP and the alternative locations recommended for the AIP-R RMP is also presented in Appendix A.

Four EDBs proposed in the SOCTIIP RMP were left in place without changes. EDB 7B at Stonehill Drive, EDBs 9A and 9B off Camino Capistrano, and EDB 11 in the parking lot off Chabot Road, did not result in property displacements and would not be impacted by the AIP-R alignment.

South of San Mateo Creek, an additional detention facility is proposed (EDB 0, Map 9 or 10) to treat runoff generated along the existing I-5 corridor that is currently discharged to San Mateo Creek untreated. This underground detention facility was proposed by SOCTIIP as part of the complete ultimate alternative that included the proposed Orange County Toll Road through San Onofre State Park. This facility in conjunction with EDB 1 would allow treatment all runoff discharged to San Mateo Creek in conjunction with the implementation of the AIP-R Alternative.

In areas where the proposed AIP-R alignment varied significantly from the SOCTIIP AIP alignment impacting proposed EDBs or where proposed EDBs resulted in property takings, new locations, resizing, and/or reshaping are recommended:

- At the Camino Real crossing, EDB 1A proposed in the SOCTIIP RMP was removed to eliminate property takings and additional capacity was provided at EDB 1B at Christianos Road.
- The Avenda de Pico crossing has been redesigned in the AIP-R alternative and EDBs 3A – 3D included in the SOCTIIP RMP were replaced with EDBs 3E – 3H located in nearby undeveloped
- At Reeves Ranch Road, EDB 4 proposed in the SOCTIIP RMP was moved to within the existing I-5 right-of-way to eliminate property takings.
- At Avenida Vaquero, EDB 5 included in the SOCTIIP RMP was reduced in size (EDB 5A) and EDB 5B was added to reduce impacts at an existing golf course/country club.
- At Calle Valez and Calle Portola, proposed EDB 6 has been reshaped to limit property takings.
- The Ortega Highway crossing has also been redesigned in the AIP-R alternative to reduce property takings. As a result EDBs 8A – 8C proposed by SOCTIIP have been replaced by EDBs 8D – 8G. EDBs 8D, 8E, and 8G are located in undeveloped areas and EDB 8F is located in an existing parking lot. EDB 8F could be constructed as an underground detention facility to limit the impact on the parking lot.

- South of Via Escolar, EDB 10A was reshaped to reduce property takings.
- The Crown Valley Parkway crossing has been redesigned in the AIP-R alternative. EDBs 10B and 10C proposed by SOCTIIP have been removed and replaced by EDB 10E significantly reducing property takings.
- At the La Paz Road crossing, EDB 11A is proposed to limit the parking lot area taken by EDB 11 as proposed by SOCTIIP.
- South of Los Alisos Boulevard, EDB 12B was moved and reshaped to reduce property takings.
- Across I-5 from the Laguna Hills Mall, EDB 13 proposed by SOCTIIP has been replaced by EDB 13A (at the Laguna Hills Mall) and EDB 13B south of El Toro Road significantly reducing property takings.
- Off Research Drive, EDB 16 was moved across I-5 to an existing agricultural field to avoid taking a new building.

Several EDBs were expanded in area to decrease depths and increase infiltration and evaporation to help address hydrograph modification requirements and to improve water quality as compared to the SOCTIIP RMP including: EDB 2 at the Presidio crossing, EDB 7A at Camino Las Ramblas, EDB 10D at the Oso Parkway crossing, EDB 14 at Gowdy Avenue, and EDB 15 at Lake Forest Drive.

Vegetated swales are also proposed in addition to the EDBs to improve water quality treatment and increase infiltration and evaporation while slowing down runoff flow rates to improve hydrograph modification performance. Areas adjacent to the existing I-5 right-of-way that are relatively flat provide opportunities for implementation of vegetated swales, including:

- South of the Presidio crossing, west of I-5.
- South of Avenida Vaquaro, existing open space areas on either side of I-5.
- South of EDB 7B, the existing quarry east of I-5 could allow for implementation of a vegetated swale in conjunction with EDB 7B.
- Between the existing frontage road at the Laguna Hills Mall and I-5.

There may be many additional areas along the I-5 corridor that can be converted into vegetated swales to further improve water quality while conveying stormwater runoff.

A detailed review of property impacts associated with the proposed AIP-R Alternative including those associated with the proposed AIP-R RMP is included in the SmartMobility report. In addition, the SmartMobility report also reflects costs and job creation related to implementation of the AIP-R Alternative including the stormwater management BMPs proposed as part of this RMP.

Conclusion

While, the EDBs in the SOCTIIP RMP are placed in low-lying areas that are topographically appropriate many of the proposed locations result in significant property impacts. In many cases, the same hydrologic performance can be maintained while reducing impacts to existing structures. With minor refinements to the locations, sizes and shapes of proposed basins, an alternative with the similar hydrologic performance can be created that limits the displacements of structures and properties. In many cases, a promising location from a landuse perspective that is between local high and low points along the I-5 corridor can be utilized to provide treatment for a portion of a sub-watershed. Providing smaller facilities at a midpoint within a sub-watershed enables down-gradient facilities to be smaller and located with reduced impacts to existing properties.

Ultimately, more detailed modeling would need to be performed to obtain permits and complete a design for construction. This modeling would need to reflect proposed grading plans and hydraulic structures and local infiltration and evaporation rates to fully demonstrate that the proposed EDBs meet flood control, water quality, and hydrograph modification requirements. Also, surveying of grades and properties, analyzing the effects of infiltration on groundwater flows and adjacent properties, identifying and rerouting utilities conflicts, land ownership and other considerations would be elements of more detailed engineering.

In summary:

1. A revised plan has been developed that reduces impact to developed areas by locating detention basins in undeveloped areas where possible. Similar methods and criteria were used in order to aid in comparison between plans proposed in the SOCTIIP AIP and the AIP-R.

2. The addition of a detention facility south of San Mateo Creek, vegetated swales, and oil-water separators and/or vortex type pretreatment devices provide improved water quality treatment for the AIP-R alternative as compared to the SOCTIIP AIP alternative.

3. The detention basins are larger than what may be needed for the added roadway in order to:
   - Treat runoff from adjacent existing roadway
   - Double the detained water volume to increase infiltration and evaporation to reduce runoff.

APPENDIX A

Table 1. Extended detention basin sizing for the AIP-R Alternative

EDB #	Tributary Area Characteristics					EDB Size							
	Tributary highway length	Approximate highway width	Tributary Area		Water quality volume	Depth	Area needed for water quality volume	Area needed for water quality volume	Area needed for water quality volume plus channel protection volume	Area needed for water quality volume plus channel protection volume	Available area	Available area
	(100 m)	(m)	(m^2)	(acres)	(m^3)	(m)	(m^2)	(acres)	(m^2)	(acres)	(m^2)	(acres)
0*	15	60	100,000	25	2,032	2.5	813	0.20	1626	40	1450	0.36
1B*	34	60	206,657	51	4,133	1.4	2952	0.73	5904	1.46	6137	1.52
2*	9	62	54,622	13	1110	0.7	1586	0.39	3171	0.78	3646	0.90
3E*	13	68	88,400	22	1,768	1.2	1473	0.36	2947	0.73	3021	0.75
3F*	3	68	20,727	5	415	1.2	345	0.09	691	0.17	712	0.18
3G*	4	68	24,872	6	497	1.1	452	0.11	904	0.22	926	0.23
3H*	5	68	37,308	9	746	0.7	1066	0.26	2132	0.53	2267	0.56
4*	9	70	59,742	15	1,195	1.2	996	0.25	1991	0.49	1996	0.49
5A*	13	68	89,125	22	1,782	1.2	1485	0.37	2971	0.73	3099	0.77
5B*	8	68	55,962	14	1,119	0.7	1599	0.40	3198	0.79	3224	0.80
6*	11	70	74,677	18	1,494	1.1	1358	0.34	2716	0.67	2761	0.68
7A*	4	70	28,700	7	583	0.8	729	0.18	1458	0.36	1573	0.39
7B	33	70	231,560	57	4,705	1.2	3,921	0.97	7750	1.92	7750	1.92
8D*	6	79	50,567	12	1,011	1	1011	0.25	2023	0.50	2189	0.54
8E*	13	79	101,134	25	2,023	0.8	2528	0.62	5057	1.25	5291	1.31
8F*	6	79	50,567	12	1,011	1.1	919	0.23	1839	0.45	1934	0.48
8G*	1	79	7,224	2	144	0.5	289	0.07	578	0.14	963	0.24
9A	14	82	105,300	26	2,140	1.2	1,783	0.44	3520	0.87	3520	0.87
9B	13	82	102,910	25	2,091	1.2	1,743	0.43	3470	0.86	3470	0.86
10A*	35	80	282,000	70	5,730	1.2	4,775	1.18	9500	2.35	9500	2.35
10E*	13	74	50,024	12	2,494	1.5	1663	0.41	3325	0.82	3340	0.83
10D*	7	74	50,024	12	1,016	0.6	1693	0.42	3387	0.84	3568	0.88
11	14	72	100,656	25	2,045	1.2	1,704	0.42	3390	0.84	3390	0.84
11A*	4	72	28,800	12	576	1.2	480	0.12	960	0.24	960	0.24
12A	12	75	91,125	23	1,852	1.7	1,089	0.27	2248	0.56	2248	0.56
12B*	11	75	79,875	20	1,623	1.2	1,353	0.33	2700	0.67	3030	0.75
13A*	5	79	38,527	10	771	0.8	963	0.24	1926	0.48	2072	0.51
13B*	7	79	57,791	14	1,156	0.7	1651	0.41	3302	0.82	3572	0.88
14*	11	85	94,605	23	1,922	1.1	1747	0.43	3495	0.86	3792	0.94
15*	9	88	75,240	19	1,529	0.6	2548	0.63	5097	1.26	5480	1.35
16*	13	108	142,776	35	2,901	1.2	2,418	0.60	4820	1.19	4950	1.22

*Denotes new or resized basin as compared to SOCTIIP RMP

Summary or Recommended Changes for Revised Runoff Management Plan

Detention Basin 0 – Located on a terrace south of San Mateo Creek on the east side of I-5.

- Located in adjacent to sensitive habitat.
- Basin proposed by SOCTIIP was relatively deep (over 8 feet).
- May need to expand basin to provide shallower ponding depths.

Extended Detention Basin 1A – Located inside a cloverleaf at the Camino Real under crossing. The capacity in EDB-1A can be accommodated in an expanded EDB-1B.

- Removed.
- Combined with EDB-1B

Extended Detention Basin 1B – Located at southern project boundary south of Christianitos Road.

- Enlarged to accommodate runoff from EDB-1A
- Reshaped to eliminate impacts to existing access road.
- Ponding depth = 1.3 m

Extended Detention Basin 2 – Located inside a cloverleaf at the Presidio under crossing. It may be possible to incorporate a vegetated swale along the east side of I-5 flowing north toward the Avenida Presidio detention basin.

- No property take as originally designed.
- Enlarged to decrease ponding depth and improve hydromod performance.
- Ponding depth = 0.7 m.
- Vegetated swale along east side of I-5, south of Presidio.

Extended Detention Basins 3A-3D – Originally located in the SOCTIIP AIP at the Avenida Pico under crossing within and adjacent to proposed clover leafs. The interchange and detention basins proposed for the SOCTIIP AIP result in considerable property displacements. This interchange has been redesigned incorporating diamond interchanges in the AIP-R to limit displacements.

- Removed Basins 3A-3D.
- Replaced with Basins 3E-3H.

Extended Detention Basins 3E-3H – Located south, east, and just north of the Avenida Pico under crossing.

- Basins 3-E, 3-F, 3-G, and 3-H may be on relatively steep slopes.
- Retaining walls may be required to stabilize slopes adjacent to the highway at Basin 3-E.

- Basin 3-E has been placed adjacent to a parking lot, if this area is too steep to construct a basin, an underground detention basin may be used in this parking lot.
- Basin 3-E results in partial displacement of parking lot.
- Basin 3-F is at the foot of a hillside. Retaining walls may be required to stabilize the hillside above the basin.
- Ponding depths = 0.7 to 1.1 m.

Extended Detention Basin 4 – Located west of I-5 at end of Via Ballena, the detention basin proposed by SOCTIPP results in a displacements of several (at least 5) homes. PWA proposes to relocate basin to within the diamond interchange at Avenida Vista Hermosa eliminating all property displacements. Alternatively, this could be a good location for use of vegetated swales.

- Relocated basin eliminates displacement of several existing homes.
- Vegetated swales may have already been constructed for this interchange. If BMPs are already in place here, no additional treatment may be needed.
- Ponding depth = 1.2 m.

Extended Detention Basin 5A – Located in parking lot of golf coarse west of I-5 at Avenida Vaquero, the detention basin originally proposed by in the AIP results in taking of the parking lot and potentially some structures. The capacity provided by this basin could be provided in a number of smaller basins located in more open space areas. PWA recommends reshaping this basin and reducing its footprint by providing additional capacity in another location. The existing undeveloped space adjacent to the I-5 right of way south of Avenida Vaquero also offers opportunities to create vegetated swales which could allow in further reductions to the footprint of the proposed basin 5A.

- Reduced capacity, additional capacity provided by basin 5B.
- Reduced area to take less of existing parking lot and eliminate displacements of structures.
- Vegetated swales on either side of I-5, south of Avenida Vaquero to improve hydromod performance and water quality treatment.
- Ponding depth = 1.2 m.

Extended Detention Basin 5B – Located adjacent to highway just south of Camino de Estrella. Basin added to reduce size of EDB-5A.

- Located in open space behind what appears to be an existing motel.
- Need to verify topography, appears to be in a local depression.
- Ponding depth = 0.7 m.

Extended Detention Basin 6 – Located east of I-5 at the corner of Calle Valez and Calle Portola, the basin proposed in the AIP displaces an existing structure and parking lot. This basin can be reconfigured to displace only a portion of the parking lot and an existing vacant lot to minimize impacts.

- Reshaped to decrease ponding depth, and to reduce property displacement.

- Located entirely within an existing parking lot.
- May be a good location for underground detention.
- Ponding depth = 1.1 m.

Extended Detention Basin 7A – Located at the Camino Las Ramblas under crossing inside a cloverleaf west of I-5. No property displacements in the originally proposed basin in the SOCTIIP AIP, PWA recommends expanding the proposed basin to utilizing the entire clover leaf to improve hydromod performance.

- Basin resized to reduce ponding depth.
- Ponding depth = 0.8 m.

Extended Detention Basin 7B – Located at existing quarry area north of Stonehill Drive. The proposed basin in the SOCTIIP AIP is relatively large. There are opportunities (existing low points east of highway) to provide a couple of smaller basins to decrease the size EDB 7B if necessary. However, EDB7B has a good location, relatively close to an existing channel for managing overflows. Existing quarry area south of EDB 7B on the east side of I-5 could be utilized for a vegetated swale.

- No property displacements as designed (on quarry property).
- May be enlarged to reduce ponding depth to improve hydromod performance.
- Add swale south of basin to improve hydromod performance and water quality.
- Ponding depth = 1.2 m.

Extended Detention Basin 8A – 8C – The location for Basin 8A proposed in the SOCTIIP AIP resulted in displacement of several homes and a part of a mall along Avenida Las Amigos just north of San Juan Creek. Basins 8B and 8C proposed in the SOCTIIP AIP were located within a proposed clover leaf interchange at Ortega Highway that has been redesigned as a diamond interchange in the proposed AIP-R Alternative to reduce property displacements.

- Removed Basins 8A - 8C.
- Replaced with Basins 8D – 8G.

Extended Detention Basin 8D – 8G – PWA is examining a number of locations for potential EDBs. There are also a number of opportunities for vegetated swales along this stretch of highway.

- Relocated to basins 8D - 8G.
- EDB 8D is located east of I-5 in an open space area north of El Horno.
- EDB 8E is located east of I-5 in an open space area off San Juan Creek Road. This area may be sensitive habitat. Field confirmation is requested.
- EDB 8F is located west of I-5 in the parking lot of the existing mall south of Ortega.
- EDB 8G is located east of I-5 in an open space area off San Juan Creek Road.
- Ponding depths: 8D = 1.0 m; 8E = 0.8 m; 8F = 1.1 m; 8G = 0.5 m.

- Basin 8F may be a good candidate for underground detention.

Extended Detention Basin 9A and 9B – Location proposed by SOCTIIP in existing groves southwest of I-5 off Camino Capistrano.

- No displacement of existing structures as designed by SOCTIIP. Left unchanged.
- Ponding depth = 1.2 m (basin 9A and 9B).

Extended Detention Basin 10A – The basin proposed by SOCTIIP is located in relatively open space east of I-5 just south of Via Escolar. The proposed basin does not result in significant property taking, and can be reshaped to reduce takings. However, the area is relatively hilly, which could impact capacity of the basin.

- Reshaped to reduce property displacements.
- According to aerial photos, this area may be developed. Field confirmation is requested.
- Ponding depth = 1.2 m.

Extended Detention Basin 10B – 10C – The SOCTIIP AIP proposed basin 10B is located within a cloverleaf at the Crown Valley Parkway overpass interchange. This interchange has been redesigned to reduce property displacements. PWA proposes EDB 10E located within and under the diamond off ramp east of I-5 and south of Crown Valley Parkway to replace the capacity provided by Basin 10B.

- Removed, and replaced by EDB 10E.

Extended Detention Basin 10C – The basin proposed for the SOCTIIP AIP located west of I-5 off Camino Capistrano and north of Crown Valley Parkway resulted in a property taking. PWA proposes to eliminate this basin and replace its capacity at EDB10E.

- Removed and replaced by EDB 10E.

Extended Detention Basin 10D – The basin proposed for the SOCTIIP AIP located south of the Oso Parkway overpass did not result in any property displacements. PWA proposes to expand basin 10D to utilize the full footprint between the diamond and clover leaf to improve hydromod performance.

- Reshaped to reduce ponding depth.
- Ponding depth = 0.6 m.

Extended Detention Basin 10E – PWA proposes EDB 10E located within and under the diamond off ramp east of I-5 and south of Crown Valley Parkway included in the AIP-R Alternative to replace the capacity provided by Basin 10B proposed in the SOCTIIP AIP alternative.

- New basin that replaces EDB-10B and EDB-10C.
- Located within the diamond off ramp at the Crown Valley Interchange, basin footprint to be coordinated with revised interchange plan.
- Ponding depth = 1.5 m.

Extended Detention Basin 11 – The SOCTIIP proposed basin is located in a shopping center parking lot off Chabot Road/El Paso resulting in a partial taking. PWA is examining other potential locations to help minimize taking of the parking lot, possibly within the La Paz Road interchange.

- Examine opportunities east of I-5 for a swale and at the La Paz under crossing for an EDB.
- Located in shopping center parking lot, may be a good candidate for underground detention.
- Ponding depth = 1.2 m (as proposed by SOCTIIP).

Extended Detention Basin 11A – PWA is considering adding basin 11A within the La Paz Road interchange to help limit the size required for basin 11.

- Basin up to 0.24 acres could be created at La Paz crossing, decreases required size for EDB 11 by from 0.84 acres to 0.6 acres, reducing displacement of existing parking lot.
- La Paz interchange location has potential to offer improved water quality treatment as compared to underground facility in parking lot at EDB11.
- Ponding depth = 1.2 m.

Extended Detention Basin 12B – The SOCTIIP proposed basin is located on the west side of I-5 south of Los Alisos Boulevard within an existing creek corridor. PWA proposes to reshape EDB12B to move it to the floodplain of the existing creek corridor. There is also an opportunity to create a vegetated swale along the west side of I-5 leading down to the proposed EDB.

- Reshaped slightly to reduce take and ponding depth.
- Hydraulics of creek corridor would need to be examined to ascertain if proposed basin/berms would impact flood flows in creek.
- Ponding depth = 1.1 m.

Extended Detention Basin 12A – The SOCTIIP proposed basin is located at the southeast portion of the Alicia Parkway interchange between the clover leaf and diamond ramps. PWA may propose to move this basin to lower areas within the diamond and clover leaf on the east side of I-5 and to expand the footprint to improve hydromod performance.

- Possible to move basin to west side of I-5 and expand footprint.
- Maybe worth creating a second basin in the northwest diamond to reduce the capacity needed in EDB12B.
- Unable to view the RMP figure that has this basin.
- Ponding depth = 1.7 m.

Extended Detention Basin 13 – The SOCTIIP proposed basin is located east of I-5 across from a major shopping mall south of El Toro Road and results in significant property takings.

- Removed and replaced with EDB 13A and 13B.

Extended Detention Basin 13A – PWA proposes to replace EDB 13 with EDB 13A and EDB 13B. EDB 13A would be located within a new diamond interchange at the El Toro mall. A vegetated swale could be created between the access road and I-5 leading to the proposed EDB.

- Replaces EDB-13.
- Located within proposed shopping mall interchange.
- Ponding depth = 0.8 m.

Extended Detention Basin 13B – PWA proposes EDB 13B adjacent to the diamond ramp south of El Toro Road and east of I-5 in the area identified by SmartMobility for commuter parking.

- Replaces EDB-13.
- Located within El Toro Road interchange.
- Ponding depth = 0.7 m.

Extended Detention Basin 14 – The SOCTIIP proposed basin is located in an existing open space area off Gowdy Avenue south of Ridge Route Drive and east of I-5. This proposed basin results in some takings of the existing Gowdy Avenue. PWA proposes to reshape the basin within the available open space area. In addition, the east side of I-5 offers an opportunity for a vegetated swale in the open space north of El Toro to the proposed EDB.

- Reshaped slightly to reduce take.
- Located within a small park.
- Ponding depth = 1.2 m.

Extended Detention Basin 15 – The SOCTIIP proposed basin is located within the diamond ramp south east of the I-5 / Lake Forest interchange. Since this basin does not result in any property takings, we propose to expand the basin foot print to cover the available open space area to improve hydromod performance.

- Resized to reduce ponding depth.
- Located within Lake Forest interchange.
- Ponding depth = 0.6 m.

Extended Detention Basin 16 – The SOCTIIP proposed basin is located on a former vacant lot that is now occupied by a new office building on Research Drive west of I-5. PWA proposes to move this basin across I-5 to an existing agricultural field.

- Relocate to agricultural field.
- No change in basin size.
- Ponding depth = 1.2 m.

C

Appendix I

- July 2005 Smart Mobility Report

smart mobility

Smart Mobility, Inc.
16 Beaver Meadow Road
Aldrich House #3
P.O. Box 750
Norwich, VT 05055
(802) 649-5422
www.smartmobility.com

A Practical, Cost Effective, and Environmentally Superior Alternative to the Foothills South Toll Road for the South Orange County Transportation Infrastructure Improvement Project

Prepared By:

Norman L. Marshall

Prepared for the California State Parks Foundation

July, 2005

Summary

The Transportation Corridor Agencies (TCA) present voluminous traffic modeling and analysis attempting to show that a new toll corridor is necessary to accommodate future traffic needs in South Orange County.[1] But a close look at the numbers and analysis presented show that a refined series of arterial and I-5 improvements could practically and cost-effectively meet future traffic demand without sacrificing irreplaceable natural resources.

TCA rejected a similar alternative (the Arterial Improvements Plus or "AIP" alternative) from full consideration in the DEIS/SEIR because of purported high displacement impacts and associated costs. Notably, these purported displacements and costs were not supported by any description of methodology and assumptions, either in the DEIS/SEIR or in its underlying technical reports. This critical gap precludes assessment of whether these costs are real. Moreover, displacement impacts for roadway projects can often be reduced or eliminated through design refinements, such as re-striping, widening on one side where no displacement would result and moving the centerline, not widening at all on sections where projected demand is low, *The TCA never engaged in any effort to refine the design of the AIP alternative to avoid displacement.*

In fact, a refined version of the AIP alternative, which includes limited I-5 widening and arterial improvements, could provide superior traffic benefits—and minimize or eliminate displacement impacts and costs—completely avoiding the heavy environmental cost of building a new toll road through south Orange County parks and ecological reserves. Moreover, if this refined alternative included High Occupancy Toll (HOT) lanes instead of High Occupancy Vehicle (HOV) lanes on the I-5 assumed in the AIP alternative, an important source of new revenue would be created to help fund the project while maximizing efficiency.

This refined scenario represents a balanced approach, combining the addition of one HOV or HOT lane on high-demand segments of I-5 with a set of arterial improvements similar to those tested in the AIO (Arterial Improvements Only) alternative of the DEIR/DEIS. The arterial improvements might include expanding of Antonio Parkway/Avenida La Pata to an eight-lane smart street from Oso Parkway to San Juan Creek Road and to a six-lane smart street from San Juan Creek Road to Avenida Pico, and other improvements, accomplished so as to avoid displacement impacts.

[1] *Environmental Impact Statement/Subsequent Environmental Impact Report and Draft Section 4(f) Evaluation for the South Orange County Infrastructure Improvement Project* (DEIS/SEIR) and the associated *Traffic and Circulation Technical Report* (TCTR)

Traffic Performance

The traffic performance of a combined arterial/I-5 approach such as the AIP alternative compares favorably with *any* of the toll road corridor alternatives proposed by TCA, whether the performance metric is reducing future *Interstate 5* congestion, reducing vehicle delay on the arterial system, or reducing total vehicle hours of travel.

Metric 1: Reduction of Future I-5 Congestion

The Traffic Technical Report summarizes projected 2025 congestion on I-5 in terms of Percent of Daily I-5 VMT [vehicle miles traveled] in the Study Area Under Congested Conditions. For the No Action alternative, the statistic [percentage increase?] is 16.9%. The values for the 11 new toll road alternatives range from 2.4% - 15.2%. *The AIP alternative outperforms all the new toll road alternatives, with only 2.2% of daily I-5 VMT operating under congested conditions in 2025.*

Metric 2: Vehicle Delay on Arterials

The Traffic Report summarizes year 2025 arterial roadway congestion in terms of *Vehicle Delay on the Arterial System.* For the No Action alternative, the number is 9,944 **hours of delay during the morning and afternoon peak traffic periods** . The values for the 11 new toll road alternatives range from 7,677 to 8,708. *Again the AIP alternative outperforms all toll road alternatives, with a value of 7,589.*

Metric 3: Total Vehicle Hours Traveled

Finally, the Traffic Report analyzes total vehicle hours of travel (VHT) for the modeled area of impact. Compared to the No Action alternative, the 11 toll road alternatives reduce VHT by 0.01% to 0.16%. The combined scenario is shown as reducing VHT by a comparable 0.08%.

It is critical to bear in mind that even under TCA's flawed approach to traffic modeling, the combined alternative under-performs the best performing toll road alternative by only a *small fraction of one percent.* In reaching these numbers, TCA declined to employ universally accepted modeling procedures that take into account the effects of congestion on trip distribution by using "feedback loops" to provide a far more accurate projection of traffic impacts – despite TCA's acknowledgement that such modeling would reduce the traffic benefits of the toll road alternatives relative to the other alternatives. TCA's stated rationale for this decision was that the more accurate modeling would likely have shown a relative improvement in the performance of the AIP of *up to one percent* – a difference it described as "relatively minor." (Traffic and Circulation Technical Report "TCTR", p. 1-10) But even a one percent difference *is over ten* times the difference between the best performing alternative and the AIP using TCA's own calculations.

The TCA's conclusion that a toll road corridor alternative will most effectively reduce Vehicle Hours Traveled is therefore undermined by *the TCA's own methodology and assumptions.* Indeed, more accurate modeling using standard feedback loop procedures would likely show that a combined alternative would *outperform* the toll toad alternatives in VHT reduction.

Displacement Impacts and Costs

The DEIS/SEIR rejects a combined alternative as infeasible based on "project costs" and because it purportedly "displaces 898 residences." (DEIS/SEIR, ES-16) The costs are in large part due to the purported displacements, so the estimate of displaced residences is critical to the feasibility determination. *The*

DEIS/SEIR fails to document, however, how the displacements were estimated. A technical report entitled Draft Relocation Impacts Technical Report: Final (December 2003) states the properties were counted if they fell within "limits of disturbance." While there are some definitions as to when properties are considered disturbed, no information is given as to how the area of disturbance was calculated along existing roadways. Since the AIP alternative would generally require a mere 13-foot widening on each side of I-5, the estimated displacements appear on their face to be unrealistically high.

In any event, TCA failed to take into consideration how even minor refinements to the design of the AIP might greatly reduce or even eliminate these impacts and costs. These include refinements such as re-striping, widening on one side and moving the centerline, or not widening at all on sections of the I-5 and selected arterials where projected future traffic demand is low. Such a refinement process is critical when working within the constraints of the built environment. Simply laying down a wide buffer of potential impacts and counting properties touched does not represent a serious consideration of non-toll road alternatives.

This refusal to refine the AIP or other non-toll road alternatives markedly contrasts with the numerous variations of a toll road alternative considered in the DEIR/DEIS that were developed to reduce negative impacts such as displacement. The AIP alternative should have similarly been refined to identify the design capable of providing maximum benefits while minimizing displacements and costs.

Refinements might include no widening of the I-5 along segments modeled as uncongested assuming implementation of the arterial improvements. Where I-5 lanes need to be added, the centerline could be shifted slightly so that widening impacts only one side of the road where needed to avoid or minimize displacement impacts. Similarly, alternative alignments and re-striping could avoid or minimize displacement for the arterial widening. By avoiding displacement impacts, these modifications are likely to be cost effective. The documentation reflects that none of these obvious refinements were considered.

Conversion to HOT lanes should also be seriously considered. HOT lanes have been very successful on SR-91 in Orange County and I-15 in San Diego County. The San Diego Association of Governments has HOT lanes on I-5 in San Diego County in its adopted long-range transportation plan. Since South Orange County is the bridge between the greater Los Angeles and San Diego regions, an unbroken set of HOT lanes would encourage higher vehicle occupancy rates. These higher vehicle occupancy rates would reduce traffic volumes not only on I-5 but also on arterials and local roads used to access I-5. The HOT lanes also would provide an important source of new revenue.

In sum, a toll-road corridor alternative is demonstrably not necessary to meet future traffic goals. Indeed, a balanced set of arterial and HOV/HOT lane improvements on the I-5 will likely provide superior traffic benefits. Purportedly prohibitive economic and displacement costs can be reduced or eliminated through refinements, an exercise that TCA inexplicably failed to undertake. This exercise must proceed, and further independent analysis performed, before demonstrably well-performing I-5 widening alternatives can be rejected on economic grounds.

The Combined Alternative/AIP Alternative Analysis in DEIS/SEIR

The DEIS/SEIR models an I-5 scenario that includes adding 1 general purpose lane and 1 HOV lane in each direction throughout most of the study corridor. This would be costly and could have significant impact on adjoining property owners. In contrast, the combined scenario adds only a single lane (HOV) in each direction. This would be much less costly and have much less impact on adjacent property owners.

The combined scenario represents a balanced approach, combining limited capacity expansion on I-5 with arterial improvements. I-5 improvements include: "the addition of spot mixed-flow auxiliary lanes south of Ortega Highway and south of Avenida Pico, and the reconstruction of several existing I-5 interchanges." (TCTR, p. 2-23) The arterial improvements in the combined scenario are the same as those in the AIO alternative described in the DEIS/DEIR. Specifically, they include:

> *... the expansion of Antonio Parkway/Avenida La Pata to an eight lane smart street from Oso Parkway to San Juan Creek Road and to a six-lane smart street from San Juan Creek Road to Avenida Pico. In addition, Smart street technologies would also be included on Ortega Highway between Antonio Parkway/Avenida La Pata and I-5, Camino Las Ramblas between Avenida La Pata and I-5, and Avenida Pico between Avenida La Pata and I-5. Smart street technologies include a combination of advanced traffic management strategies such as traffic signal coordination, real time monitoring and surveillance, and traveler information, as well as modest physical improvements such as additional turn lanes at intersections. The effectiveness of providing grade separation at the intersections of Antonio Parkway/Oso Parkway, Antonio Parkway/Crown Valley Parkway, Antonio Parkway-La Pata Avenue/Ortega Highway, and Avenida La Pata/Avenida Pico will also be considered in the evaluation of the AIO Alternative. (TCTR, p. 2-19, 2-23)*

The combined approach, in the form of the AIP alternative, is rejected from full consideration in the DEIS/SEIR for the reasons given in the paragraph below.

> *Arterial Improvements Plus HOV and Spot Mixed-Flow Lanes on I-5 (AIP) Alternative. The AIP Alternative performed poorly in project costs and in cost per hour of travel time saved; well for traffic operating in congestion on I-5; moderately for hours of travel times savings; well in impacts to riparian ecosystems, CSS and gnatcatchers; and it displaces 898 residences. Based on the very poor performance of this Alternative related to project costs and socioeconomics, the Collaborative agreed to eliminate the AIP Alternative from consideration in the EIS/SEIR. (DEIS/SEIR, p. ES 16)*

As this paragraph indicates, the rejection of this alternative was based entirely on "costs and socioeconomics." TCA concedes that the combined scenario performs "well" for I-5 congestion, impacts to riparian ecosystems, CSS and gnatcatchers. It is also listed as "moderate" for "hours of travel time savings" but it actually performs excellently, as I explain below. The only negative factor identified by TCA – the purported displacement and related costs -- are unsupported by any evidence in the record that has been made available to the public. More importantly, any displacement that would be caused under the configuration modeled might be drastically reduced or eliminated through feasible refinements, none of which were considered by TCA.

Future I-5 Congestion

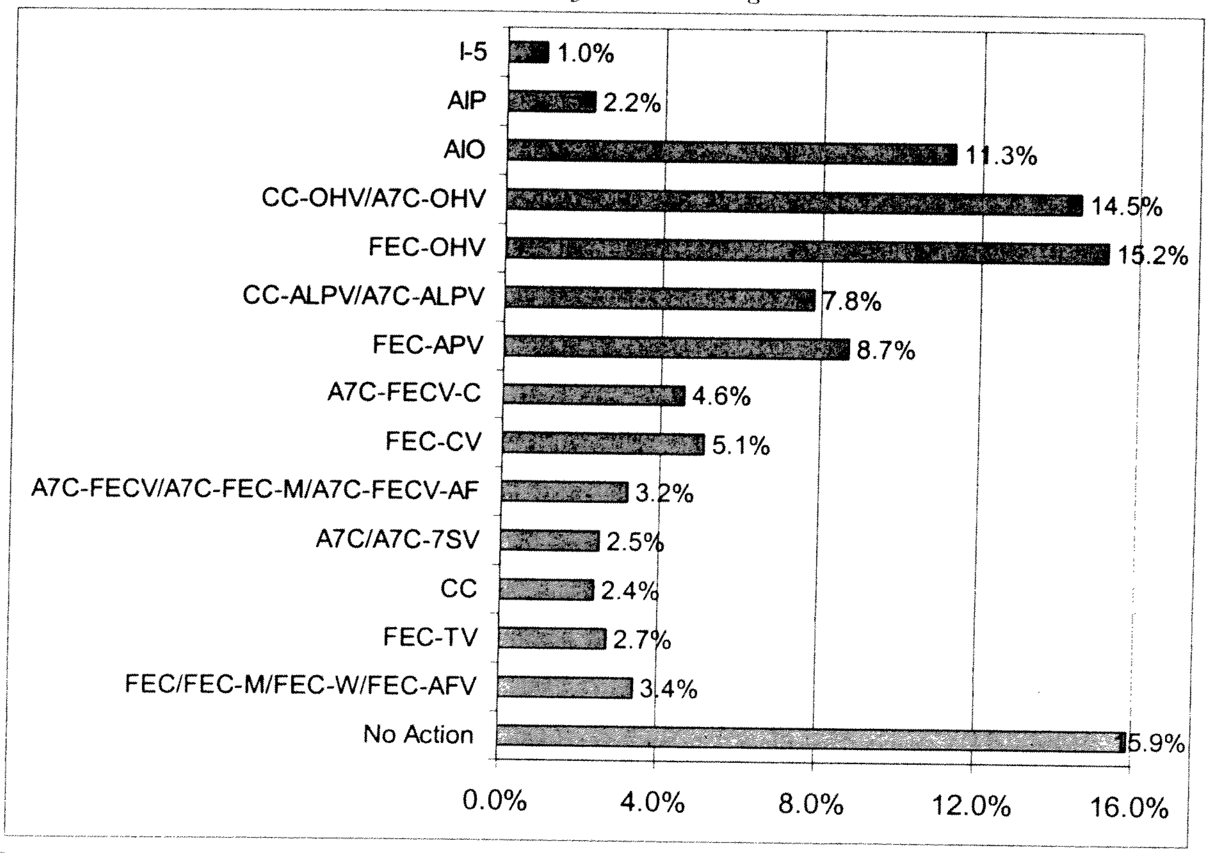
Reducing future congestion on I-5 is one of the critical goals of the South Orange County Transportation Infrastructure Improvement Project. The DEIS/SEIR analysis shows that construction of a new toll road is less effective in reducing future congestion on I-5 than are improvements on I-5 itself.

> *As shown in Table 4-42, the I-5 and AIP Alternatives generally have less congestion on I-5 than the other Build Alternatives. This is because both of these Alternatives include improvements to I-5, where substantial*

congestion occurs under both existing conditions and future No Action Alternative conditions. (TCTR, p. 4-121)

As shown below, the two I-5 improvement alternatives ("I-5" and "AIP") outperform all eleven toll road alternatives on this performance measure.

DEIS/SEIR Modeled Percent of Daily I-5 VMT in Study Area under Congested Conditions



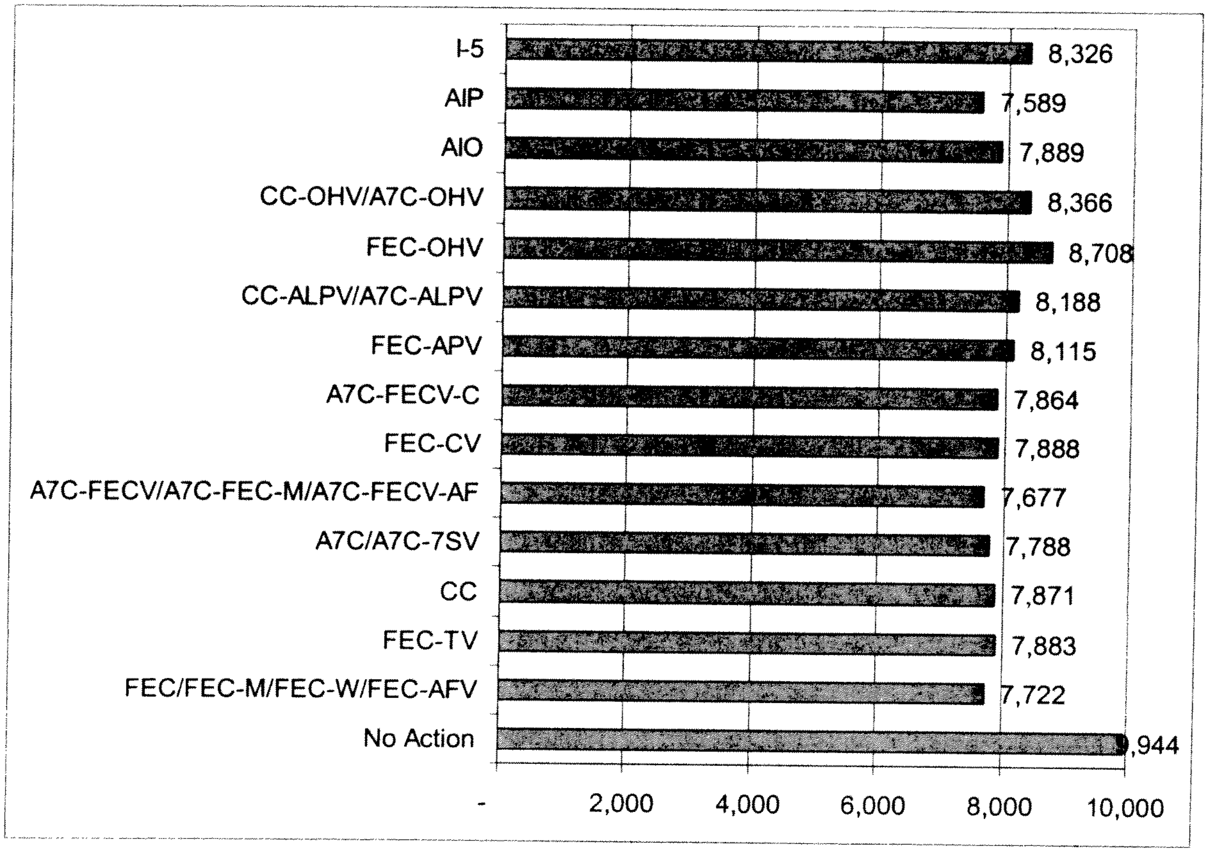
Source: Scenario 3[2], TCTR, Table 4-42.

Arterial Congestion

Table 4-43 of the Traffic and Circulation Report sums the daily peak period intersection delays for a common set of intersections. For both Scenarios 3 and 4 (the only ones where alternative AIP was modeled), the AIP alternative performs the best of all alternatives. The delay totals are shown below for Scenario 3.

[2] Results for Scenario 3 are used throughout this report as this scenario was modeled for all alternatives and provides for comparison. Scenario 3 includes the buildout circulation system and the RMV plan.

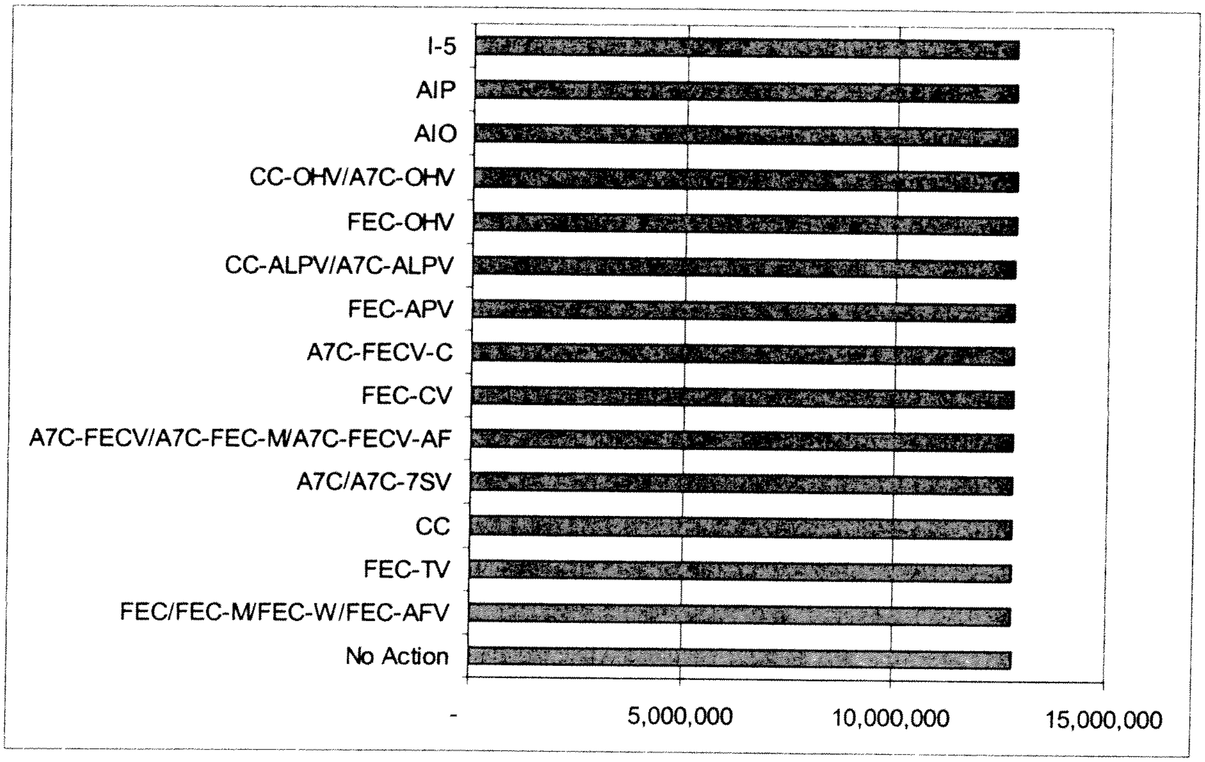
Summary of 2025 Vehicle Delay on the Arterial System (from Table 4-43 of TCTR)



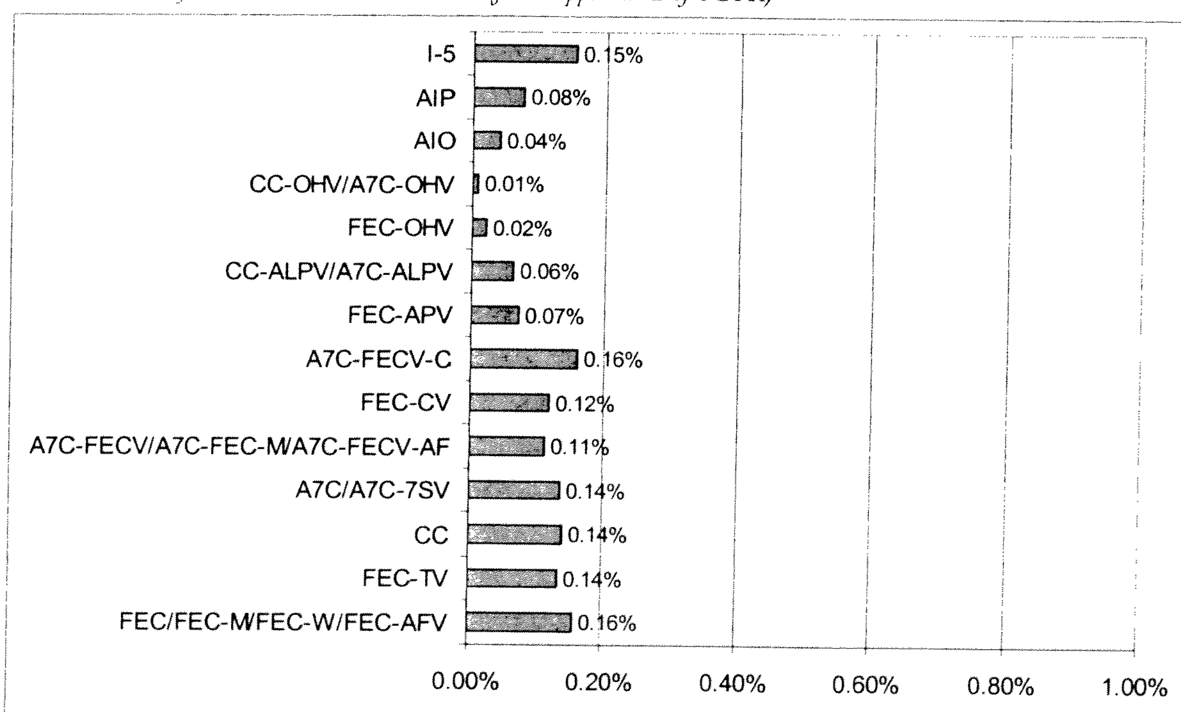
Total Vehicle Hours of Travel (VHT)

The TCTR Appendix B reports total vehicle hours of travel (VHT) for the modeled area. The following two figures summarize the results for Scenario 3. First, all of the totals are shown to illustrate how small the differences are. (The range of differences is only 0.16%.) Then the differences are shown on a scale that allows comparison.

Summary of 2025 Vehicle Hours of Travel - VHT (from Appendix B of TCTR)



VHT Reductions from 2025 No Action Scenario (from Appendix B of TCTR)



Compared to the No Action alternative, the 11 toll road alternatives reduce VHT by 0.01 to 0.16%. (Note these values all are much less than 1 percent.) The AIP scenario is shown as reducing VHT by 0.08% which puts it in the middle of the pack under TCA's modeling.

However, this is not the entire story. The DEIS/SEIR modeling used procedures that show greater benefits for the toll road alternatives than would be shown using commonly employed procedures that feed back congested travel times into the trip distribution step of the modeling exercise. The use of a feedback loop is widely recognized among traffic professionals as necessary to account for changes in individuals' transportation choices as a result of increased congestion on certain roadways. TCA justified its failure to incorporate this added step by saying that the resulting difference would be "relatively minor . . . less than one percent of the VMT or VHT forecast in southern Orange County." (TCTR, p. 1-10)

But this so-called "minor" difference of one percent is more than five times the apparent benefit of the best performing alternative, and over ten times the difference between the best performing alternative and the AIP alternative. The DEIS/DEIR's comparison of the various alternatives to the one-tenth of a percent using VHT reduction as a metric is therefore meaningless. Indeed, it is likely that the AIP alternative would outperform the toll toad alternatives in VHT reduction if proper modeling procedures were used.[3]

Modeling methodology is critical. The TCTR states:

> *The SCSAM follows nationally accepted "best practices" in the engineering profession. Such models are capable of forecasting induced travel demand that may occur when accessibility is improved in a transportation corridor due to circulation system improvements in that corridor. In a travel demand model, such induced travel is accounted for through differences in trip distribution, mode choice and route choice between transportation alternatives (demonstrating differences in trip generation due to transportation alternatives is difficult to assess without an integrated land use/transportation model). This is typically accomplished using "feedback loops" in which congested roadway speeds from a traffic assignment are looped back to the trip distribution and mode choice components of the travel demand model. This feedback process is sometimes referred to as "speed recycling" because it uses an iterative procedure to derive congested speeds for use in determining trip distribution and mode choice. (p.1-9)*

We agree with TCA's consultant that "best practices" include feeding back congested travel times to trip distribution. Model feedback has been required by Federal air quality modeling regulations for conformity determinations since 1993 and this provision was reaffirmed after public comment in 1997 as discussed below.

> *The final rule's fifth network modeling requirement is based on Sec. 51.452(b)(1)(iv)/Sec. 93.130(b)(1)(iv) of the November 1993 conformity rule, which requires feedback of travel times resulting from traffic assignment to travel times used in trip distribution. Although this requirement was not proposed as part of option 3, EPA received comments based on proposed option 2 that this requirement of the original rule should be retained. Commenters pointed out that this type of consistency in the evaluation of travel time is almost universally recognized to be scientifically valid. A commenter stated that not requiring feedback would allow analyses to be manipulated to produce desired results. Another commenter stated that most MPOs have already implemented full feedback, and it is easy to perform and more accurate than partial feedback. Commenters submitted technical reports and papers to the docket in order to document their claims that full feedback is recognized to be a necessary and sound modeling improvement.*

---

[3] The TCTR reports that the AIP alternative reduces systemwide vehicle miles of travel (VMT) compared with the No Action alternative. All new toll road alternatives are reported to increase VMT over the No Action alternative. (Table 4-41, p. 4-113 – 4-115. VMT is highly correlated with air emissions and energy use.

> *EPA agrees with commenters that there is clear theoretical justification for feedback between traffic assignment and trip distribution, and that feedback may be essential to accurate forecasts when congestion exists. In addition, EPA agrees that full feedback is already widely available and used. As a result, EPA believes it is appropriate to retain the feedback requirement. (Federal Register: August 15, 1997, Volume 62, Number 158, Page 43779-43818, Transportation Conformity Rule Amendments: Flexibility and Streamlining)*

The DEIS/SEIR inappropriately relies on traffic forecasts made without feedback even though the modelers were aware of the issue and even did sensitivity analyses to investigate the issue. It was determined that:

> *The OCTAM and SCSAM results indicated that the magnitude of improvement provided by the SOCTIIP Build Alternatives, (for example, in terms of traffic relief on I-5 and area-wide reduction in VHT), is somewhat less when using different trip distributions based on feedback loops rather than a static trip distribution. (TCTR, p. 1-10.)*

Modeling with feedback is proper, and modeling without feedback is improper. The TCTR admits that modeling with feedback shows less benefit for the build alternatives than presented in the DEIS/SEIR. Using the modeling results without feedback simply does not provide an accurate basis for comparison of the alternatives.

That the purported differences in the projections that would be obtained using feedback loops would be "no more than one percent of the peak hour or ADT volumes forecast on I-5," does not excuse TCA's decision to ignore those differences, given the much smaller differences in performance between the alternatives. (TRTC p. 1-10). Even a one percent difference is *ten times* the shortfall in VHT reduction performance between the AIP [combined] alternative and the *best* performing corridor alternative. Elsewhere in the DEIR/DEIS and TRTC, TCA finds these much smaller differences between the alternatives to be highly significant, dividing the alternatives into three sets of ranked groups (TCTR, p. 4-112). TCA cannot credibly assert, as it has, that *one percent* of VHT reduction is *in*significant while *one tenth* of one percent is significant.

Displacement Impacts and Costs

The DEIS/SEIR rejects the AIP alternative from full consideration based on "project costs" and because it "displaces 898 residences." (DEIS/SEIR, ES-16) The costs are largely based on the displacements, so the estimate of displacements is critical to TCA's finding of infeasibility. Yet, the DEIS/SEIR fails to document how the displacements are estimated. There is a report entitled *Draft Relocation Impacts Technical Report: Final,* prepared by P&D Consultants, Inc. and dated December 2003. This report describes how properties were counted if they fell within "limits of disturbance." While there are some definitions as to when properties are considered disturbed, no information is given as to how the area of disturbance was calculated along existing roadways. As the AIP alternative would generally add only one 13-foot lane to each side of I-5, the estimated displacements appear to be unrealistically high.

Refined Combined Alternative

The DEIS/SEIR considers many refinements of the toll road alternative concept--with some alternatives having been developed during the process to build on benefits and reduce negative aspects of earlier alternatives. The TCA utterly fails to undertake a similar refinement process concerning I-5 widening alternatives such as the AIP alternative. Such a refinement process is essential when working within the constraints of the built environment. Simply laying down a wide buffer of potential impacts and counting properties touched does not represent a proper planning process.

The AIP alternative should be refined to maximize benefits and minimize or eliminate displacements and costs. Refinements could include reducing the need for widening I-5 along the entire length, since some segments of I-5 are modeled as uncongested if the arterial improvements in the AIO alternative are built. In other segments of I-5 where a lane might be added, shifting the center line slightly so that there are 26 feet of impact to one side of the road rather than 13 feet of impact to both sides of the road might eliminate potential displacements.

The same holds true for any necessary arterial widening. These need to be reviewed where there are significant impacts. TCA has made no attempt to determine whether lesser widening is possible for certain impacted segments, or whether it would be more cost effective to do the widening on one side rather than both sides for other segments.

Conversion to HOT lanes on the I-5 should also be seriously considered. HOT lanes have been very successful on SR-91 in Orange County and I-15 in San Diego County. The San Diego Association of Governments has HOT lanes on I-5 in San Diego County in its adopted long-range transportation plan. South Orange County is the bridge between the greater Los Angeles and San Diego regions, and an unbroken set of HOT lanes would encourage higher vehicle occupancy rates. These higher vehicle occupancy rates would reduce traffic volumes on I-5 but also on arterials and local roads used to access I-5. The HOT lanes also could provide an important source of new revenue.

TCA has not seriously investigated the potential for a refined alternative combining limited I-5 and arterial improvements to solve future traffic problems in a cost-effective way, and instead has focused almost exclusively on toll road corridor alternatives with far greater environmental effects. TCA rejected this alternative based on purported displacement effects that have not been documented, and that in any event could potentially be avoided by obvious design measures never considered by TCA. Available data, including the studies generated by the TCA itself, offer convincing evidence of the potential of a combined alternative to reduce traffic congestion in the County as well or better than the toll-road alternatives.

D

NORMAN L. MARSHALL, PRINCIPAL

nmarshall@smartmobility.com

EDUCATION:

Master of Science in Engineering Sciences, Dartmouth College, Hanover, NH, 1982
Bachelor of Science in Mathematics, Worcester Polytechnic Institute, Worcester, MA, 1977

PROFESSIONAL EXPERIENCE:

Norm Marshall helped found Smart Mobility, Inc. in 2001. Prior to this, he was at Resource Systems Group, Inc. for 14 years where he developed a national practice in travel demand modeling. He specializes in analyzing the relationships between the built environment and travel behavior, and doing planning that coordinates multi-modal transportation with land use and community needs.

Transit Planning

Regional Transportation Authority (Chicago) and Chicago Metropolis 2020 – evaluating alternative 2020 and 2030 system-wide transit scenarios including deterioration and enhance/expand under alternative land use and energy pricing assumptions in support of initiatives for increased public funding.

Capital Metropolitan Transportation Authority (Austin, TX) Transit Vision – analyzed the regional effects of implementing the transit vision in concert with an aggressive transit-oriented development plan developed by Calthorpe Associates. Transit vision includes commuter rail and BRT.

Bus Rapid Transit for Northern Virginia HOT Lanes (Breakthrough Technologies, Inc and Environmental Defense.) – analyzed alternative Bus Rapid Transit (BRT) strategies for proposed privately-developing High Occupancy Toll lanes on I-95 and I-495 (Capital Beltway) including different service alternatives (point-to-point services, trunk lines intersecting connecting routes at in-line stations, and hybrid).

Central Ohio Transportation Authority (Columbus) – analyzed the regional effects of implementing a rail vision plan on transit-oriented development potential and possible regional benefits that would result.

Essex (VT) Commuter Rail Environmental Assessment (Vermont Agency of Transportation and Chittenden County Metropolitan Planning Organization)—estimated transit ridership for commuter rail and enhanced bus scenarios, as well as traffic volumes.

Georgia Intercity Rail Plan (Georgia DOT)—developed statewide travel demand model for the Georgia Department of Transportation including auto, air, bus and rail modes. Work included estimating travel demand and mode split models, and building the Departments ARC/INFO database for a model running with a GIS user interface.

Regional Land Use/Transportation Scenario Planning

Chicago Metropolis Plan and Chicago Metropolis Freight Plan (6-county region)— developed alternative transportation scenarios, made enhancements in the regional travel demand model, and used the enhanced model to evaluate alternative scenarios including development of alternative regional transit concepts. Developed multi-class assignment model and used it to analyze freight alternatives including congestion pricing and other peak shifting strategies. Chicago Metropolis 2020 was awarded the Daniel Burnham Award for regional planning in 2004 by the American Planning Association, based in part on this work.

Mid-Ohio Regional Planning Commission Regional Growth Strategy (7-county Columbus region)—developed alternative future land use scenarios and calculated performance measures for use in a large public regional visioning project.

Envision Central Texas Vision (5-countyregion)—implemented many enhancements in regional model including multiple time periods, feedback from congestion to trip distribution and mode choice, new life style trip production rates, auto availability model sensitive to urban design variables, non-motorized trip model sensitive to urban design variables, and mode choice model sensitive to urban design variables and with higher values of time (more accurate for "choice" riders). Analyzed set land use/transportation scenarios including developing transit concepts to match the different land use scenarios.

Baltimore Vision 2030—working with the Baltimore Metropolitan Council and the Baltimore Regional Partnership, increased regional travel demand model's sensitivity to land use and transportation infrastructure. Enhanced model was used to test alternative land use and transportation scenarios including different levels of public transit.

Burlington (Vermont) Transportation Plan – Leading team developing Transportation Plan focused on supporting increased population and employment without increases in traffic by focusing investments and policies on transit, walking, biking and Transportation Demand Management.

Roadway Corridor Planning

State Routes 5 & 92 Scoping Phase (NYSDOT) —evaluated TSM, TDM, transit and highway widening alternatives for the New York State Department of Transportation using local and national data, and a linkage between a regional network model and a detailed subarea CORSIM model.

Twin Cities Minnesota Area and Corridor Studies (MinnDOT)—improved regional demand model to better match observed traffic volumes, particularly in suburban growth areas. Applied enhanced model in a series of subarea and corridor studies.

Developing Regional Transportation Model

Pease Area Transportation and Air Quality Planning (New Hampshire DOT)—developed an integrated land use allocation, transportation, and air quality model for a three-county New Hampshire and Maine seacoast region that covers two New Hampshire MPOs, the Seacoast MPO and the Salem-Plaistow MPO.

Syracuse Intermodal Model (Syracuse Metropolitan Transportation Council)—developed custom trip generation, trip distribution, and mode split models for the Syracuse Metropolitan Transportation Council. All of the new models were developed on a person-trip basis, with the trip distribution model and mode split models based on one estimated logit model formulation.

Portland Area Comprehensive Travel Study (Portland Area Comprehensive Transportation Study)—Travel Demand Model Upgrade—enhanced the Portland Maine regional model (TRIPS software). Estimated person-based trip generation and distribution, and a mode split model including drive alone, shared ride, bus, and walk/bike modes.

Chittenden County ISTEA Planning (Chittenden County Metropolitan Planning Organization)—developed a land use allocation model and a set of performance measures for Chittenden County (Burlington) Vermont for use in transportation planning studies required by the Intermodal Surface Transportation Efficiency Act (ISTEA).

Research

Obesity and the Built Environment (National Institutes of Health and Robert Wood Johnston Foundation) – Working with the Dartmouth Medical School to study the influence of local land use on middle school students in Vermont and New Hampshire, with a focus on physical activity and obesity.

The Future of Transportation Modeling (New Jersey DOT)—Member of Advisory Board on project for State of New Jersey researching trends and directions, and making recommendations for future practice.

Trip Generation Characteristics of Multi-Use Development (Florida DOT)—estimated internal vehicle trips, internal pedestrian trips, and trip-making characteristics of residents at large multi-use developments in Fort Lauderdale, Florida.

Improved Transportation Models for the Future—assisted Sandia National Laboratories in developing a prototype model of the future linking ARC/INFO to the EMME/2 Albuquerque model and adding a land use allocation model and auto ownership model including alternative vehicle types.

Peer Reviews and Critiques

C-470 (Denver region) – Reviewed express toll lane proposal for Douglas County, Colorado and prepared reports on operations, safety, finances, and alternatives.

Intercounty Connector (Maryland) – Reviewed proposed toll road and modeled alternatives with different combinations of roadway capacity, transit capacity (both on and off Intercounty Connector) and pricing.

Foothills South Toll Road (Orange County, CA) – Reviewed modeling of proposed toll road.

I-93 Widening (New Hampshire) – Reviewed Environment Impact Statement and modeling, with a particular focus on induced travel and secondary impacts, and also a detailed look at transit potential in the corridor.

Stillwater Bridge,– Participated in 4-person expert panel assembled by Minnesota DOT to review modeling of proposed replacement bridge in Stillwater, with special attention to land use, induced travel, pricing, and transit use.

Ohio River Bridges Projects– Reviewed Environmental Impact Statement for proposed new freeway bridge east of Louisville Kentucky for River Fields, a local land trust and historic preservation not-for-profit organization.

Indiana I-69 – Reviewed model analyses from Indiana statewide travel demand model of proposed new Interstate highway for coalition, including the Environmental Law and Policy Center of the Midwest.

Washington, DC region – Reviewed modeling of Potomac River bridge crossings.

Phoenix, Arizona – Reviewed conformity analyses and long-term transportation plan under contract to Tempe, a municipality in the Phoenix region.

Atlanta, Georgia – Reviewed conformity analyses and long-term transportation plan for an environmental coalition.

Daniel Island (Charleston, South Carolina) – Reviewed Draft Environmental Impact Statement for large proposed Port expansion (the "Global Gateway") for an environmental coalition.

Houston, Texas– Analyzed air quality conformity and long-term transportation plan for an environmental coalition.

PUBLICATIONS AND PRESENTATIONS (partial list)

Sketch Transit Modeling Based on 2000 Census Data, with Brian Grady. Presented at the Annual Meeting of the Transportation Research Board, Washington DC, January 2006, and *Transportation Research Record*, No. 1986, "Transit Management, Maintenance, Technology and Planning", p. 182-189, 2006.

Travel Demand Modeling for Regional Visioning and Scenario Analysis, with Brian Grady. Presented at the Annual Meeting of the Transportation Research Board, Washington DC, January 2005, and *Transportation Research Record*, No. 1921, "Travel Demand 2005", p. 55-63, 2006.

Chicago Metropolis 2020: the Business Community Develops an Integrated Land Use/Transportation Plan, with Brian Grady, Frank Beal and John Fregonese, presented at the Transportation Research Board's Conference on Planning Applications, Baton Rouge LA, April 2003.

Chicago Metropolis 2020: the Business Community Develops an Integrated Land Use/Transportation Plan, with Lucinda Gibson, P.E., Frank Beal and John Fregonese, presented at the Institute of Transportation Engineers Technical Conference on Transportation's Role in Successful Communities, Fort Lauderdale FL, March 2003.

Evidence of Induced Travel, with Bill Cowart, presented in association with the Ninth Session of the Commission on Sustainable Development, United Nations, New York City, April 2001.

Induced Demand at the Metropolitan Level – Regulatory Disputes in Conformity Determinations and Environmental Impact Statement Approvals, Transportation Research Forum, Annapolis MD, November 2000.

Evidence of Induced Demand in the Texas Transportation Institute's Urban Roadway Congestion Study Data Set, Transportation Research Board Annual Meeting, Washington DC: January 2000.

Subarea Modeling with a Regional Model and CORSIM", with K. Kaliski, presented at Seventh National Transportation Research Board Conference on the Application of Transportation Planning Methods, Boston MA, May 1999.

New Distribution and Mode Choice Models for Chicago, with K. Ballard, Transportation Research Board Annual Meeting, Washington DC: January 1998.

Land Use Allocation Modeling in Uni-Centric and Multi-Centric Regions, with S. Lawe, Transportation Research Board Annual Meeting, Washington DC: January 1996.

Multimodal Statewide Travel Demand Modeling Within a GIS, with S. Lawe, Transportation Research Board Annual Meeting, Washington DC: January 1996.

Linking a GIS and a Statewide Transportation Planning Model, with L. Barbour and Judith LaFavor, Urban and Regional Information Systems Association (URISA) Annual Conference, San Antonio, TX, July 1995.

Land Use, Transportation, and Air Quality Models Linked With ARC/INFO, with C. Hanley, C. Blewitt, and M. Lewis, Urban and Regional Information Systems Association (URISA) Annual Conference,: San Antonio, TX, July 1995.

Forecasting Land Use Changes for Transportation Alternative, with S. Lawe, Fifth National Conference on the Application of Transportation Planning Methods, Seattle WA, April 1995.

Forecasting Land Use Changes for Transportation Alternatives, with S. Lawe, Fifth National Conference on the Application of Transportation Planning Methods (Transportation Research Board),: Seattle WA, April 1995.

Integrated Transportation, Land Use, and Air Quality Modeling Environment, with C. Hanley and M. Lewis Fifth National Conference on the Application of Transportation Planning Methods (Transportation Research Board), Seattle WA, April 1995.

MEMBERSHIPS/AFFILIATIONS

Member, Institute of Transportation Engineers
Individual Affiliate, Transportation Research Board
Member, American Planning Association
Member, Congress for the New Urbanism
Technical Advisory Committee Member and past Board Member, Vital Communities (VT/NH)

E

smart mobility

LUCINDA GIBSON, PE, PRINCIPAL

lgibson@smartmobility.com

EDUCATION

- Master of Science in Engineering Sciences, Dartmouth College, Hanover, NH, 1988
- Bachelor of Science in Civil Engineering, University of Vermont, Burlington, VT, 1983

PROFESSIONAL EXPERIENCE:

Ms. Gibson helped found Smart Mobility, Inc. in 2001 and is its President. Since starting the company, Ms. Gibson has developed a national practice of innovative transportation engineering designs that meet today's challenges, and advance smarter growth and new urbanism. Her current work at Smart Mobility focuses on context sensitive and multi-modal traffic engineering, preparing alternative transportation solutions for conventional roadway projects, and preparing comprehensive, multimodal community transportation plans. This work includes bicycle and pedestrian planning and design, scenic byway corridor planning, and moving beyond conventional traffic engineering by addressing traffic congestion through improving transportation networks, consideration of land use and development patterns, and broadening the range of options in terms of both routes and modes. Prior to this, she was employed for 7 years at the Two Rivers-Ottauquechee Regional Commission as a Senior Transportation Planner, and for the previous 6 years at Resource Systems Group, Inc.

Selected Project Experience

Decommissioning of the Sheridan Expressway—Ms Gibson analyzed the options for the future of the Sheridan Expressway given the need to reconstruct one of its interchanges with the Bruckner Expressway in the South Bronx, New York City. This work was conducted for the award winning Sustainable South Bronx organization, and also included an evaluation of the economic benefits that would result to the community from the decommissioning.

Burlington Transportation Plan, Burlington, Vermont—Prepared a comprehensive, multimodal transportation master plan for the City of Burlington, Vermont, which included innovative transportation street design guidelines, parking strategies, evaluation for selected "road diets", and development of a town-wide bicycle network.

Obesity and the Built Environment—Conducting research on how the "Built Environment" as part of a team with researchers from the Dartmouth Medical School, Hanover, NH. , Evaluating the effects of transportation infrastructure and land use patterns on the health and obesity levels of children in 30 communities representing a wide array of types in VT and NH. Funded by the National Institute of Environmental Health Sciences.

Two Lane Plan for PA Route 41—Prepared conceptual plan alternative to a Four lane limited access widening proposed by Pennsylvania DOT for PA Route 41 through Chester County, PA. Analysis include use of RODEL for roundabout analysis and design, and VISSIM for developing corridor-wide measures and informational display. Plan is under consideration by PennDOT as an alternative to constructing a four lane limited access highway.

Halfmoon, NY Transportation Analysis and Plan-As part of a project team with Behan Planning Associates to develop an innovative plan for hamlet and mixed use center development in a rapidly growing suburb outside Albany, NY. Plan elements included improves street connectivity within proposed growth areas, pedestrian oriented designs and in the hamlet and mixed use areas, and illustrating access management concepts for the main highway corridors.

Barnard Villages Traffic and Growth Management Plan—Developed a plan for Barnard, Vermont's two village areas, including intersection safety, pedestrian circulation, traffic calming, establishing village identity, re-designing lakefront parking on Silver Lake, and exploring opportunities for infill development.

Chicago Metropolis 2020 Plan for Growth and Transportation-Contributed to this APA Burnham Award-winning project to explore alternative scenarios for growth and transportation investment and management for the Chicago Region. Developed alternative transportation investment strategies and budgets, and prepared modeling input files to analyze these scenarios with an advanced regional TransCAD model.

Dresden School Transportation Committee—Conducted study on the Feasibility of Queue Jump Lane for the Ledyard Bridge Approach in Norwich, Vermont. Reviewed options and obstacles for establishing a bus-only during morning peak hours for buses, with the goal of reducing bus travel time and encouraging school bus and public transit use between Norwich, Vermont and Hanover, New Hampshire.

Prairie Crossing Boulevard Plan, Grayslake, Illinois-Developed context sensitive integrated transportation and land use alternative plan for an abandoned Tollway right-of-way through a new urbanist development in Grayslake, Illinois. Integrated traffic and transportation design into community street network and land use patterns. Plan features landscaped boulevards, roundabouts, and improved street connectivity in the area.

PROFESSIONAL CERTIFICATIONS AND MEMBERSHIPS

- Professional Engineer – P.E., Vermont Board of Professional Engineering, License #6133
- Member, Institute of Transportation Engineers (ITE)
- Member, Congress for the New Urbanism, Transportation Planning Committee
- Member, Board of Directors, CNU New England Chapter of CNU
- Member, ITE/CNU Design Standards Task Force

PUBLICATIONS

Context Sensitive Design Approach for the Route 41 Corridor, Gibson, Lucinda E., and Dee Durham. Presented the Historic Roads National Conference in Portland, OR. Described multi-faceted approach including research, public involvement and education, used to develop a context sensitive plan for improvements to PA Route 41, an NHS route through scenic rural landscapes and Amish farms. April, 2004.

Chicago Metropolis 2020: The Business Community Develops an Integrated Land Use/Transportation Plan, Gibson, Lucinda E., Frank Beal, John Fregonese, Norman Marshall. Presented at the ITE 2003 Technical Conference, *Transportation's Role in Successful Communities* Presented in Fort Lauderdale, FL, 2003.

Functional Classification for Multimodal Planning, Strate, Harry E., Elizabeth Humstone, Susan McMahon, Lucy Gibson and Bruce D. Bender, Transportation Research Record #1606, Transportation Planning, Programming, and Land Use, National Academy Press, Washington DC, 1997.

SPEAKING ENGAGEMENTS (Partial List)

Smart Growth Alternative for the Mountain View Highway Corridor, presented at the Citizens Organized for Smarter Alternatives to the Lehi City Council, Lehi, Utah, March, 2007.

Smarter Alternatives to Highway Projects. Presented at the American Planning Association annual meeting in San Antonio, TX, April, 2006.

Context Sensitive Traffic Engineering for Historic Road Corridors. Presented at the biannual Historic Roads Conference, Portland, Oregon, April, 2004.

Emerging Transportation Planning Techniques for Smart Growth Planning. Presented at the Smart Growth Network annual conference in Burlington, VT, September, 2003.

F

Search Results for Professional Engineers and Professional Land Surveyors

This information is updated Monday through Friday - Last updated: JAN-21-2008

To see all the information for a licensee, click on the highlighted name. This will also include disciplinary actions if any are present.

Name	Type	Number	Status	Address	City	Zip	County
MARSHALL ALFRED LEE	M	27426	CLEAR	27 GILLETTE LANE	CAZENOVIA	13035	OUT OF STATE
MARSHALL AMY RENEE	TR	2192	CLEAR	715 ROCKDALE DR	SAN FRANCISCO	94127	SAN FRANCISCO
MARSHALL ANDREW C	M	6679	CANCELLED	2147 WILMINGTON DR	WALNUT CREEK	94596	CONTRA COSTA
MARSHALL ANTHONY BURNS	C	51015	CLEAR	1242 DUPONT CT	MANTECA	95336	SAN JOAQUIN
MARSHALL BASIL NEIL	C	33299	CLEAR	421 JEFFERSON ST	BAKERSFIELD	93305	KERN
MARSHALL BENJAMIN DEAN	SF	92	CANCELLED	5502 HONORS DRIVE	SAN DIEGO	92122	SAN DIEGO
MARSHALL BOYD T	M	5785	CANCELLED	852 SAN SIMEON RD	ARCADIA	91006	LOS ANGELES
MARSHALL BRUCE NORRIS	M	26147	CLEAR	14341 PAUL AVENUE	SARATOGA	95070	SANTA CLARA
MARSHALL CHARLES A	C	9396	CLEAR	8752 LESLIE DR	SAN GABRIEL	91775	LOS ANGELES
MARSHALL CHARLES T	C	7790	REVOKED	315 E COTATI AVE	COTATI	94928	SONOMA
MARSHALL CLOUSTON LOWELL	MF	2738	CANCELLED	1135 SIERRA MADRE VILLA	PASADENA	91107	LOS ANGELES
MARSHALL COGAN GLENN	QU	2791	CLEAR	936 GENERAL HILL DR	VIRGINIA BEACH	23454	OUT OF STATE
MARSHALL CRAIG LEONARD	C	45951	CLEAR	2109 GREENHOUSE CT	LAS VEGAS	89134	OUT OF STATE
MARSHALL DAVID EARL	E	12921	CLEAR	175 WEST JACKSON BLVD_STE 1400	CHICAGO	60604	OUT OF STATE
MARSHALL DAVID NOEL	C	24886	CLEAR	165 N BUCKTHORN DR	BREA	92621	ORANGE
MARSHALL DONALD E	M	22250	CLEAR	222 TREYBURN DR	KNOXVILLE	37934	OUT OF STATE
MARSHALL	M	12665	CLEAR	31 KING AVE	PIEDMONT	94611	ALAMEDA

DONALD JAY							
MARSHALL DONALD JAY	CH	2809	DELINQUENT	P.O. BOX 372	NORTON	027660372	OUT OF STATE
MARSHALL DONALD KEITH	M	18772	CLEAR	902-43RD ST NW	MARYSVILLE	98271	OUT OF STATE
MARSHALL DONALD WILLIAM	C	22058	CLEAR	2553 ISLAND GROVE BLVD	FREDERICK	21701	OUT OF STATE
MARSHALL DUNCAN	L	8260	CLEAR	11705 SOLANA DRIVE	DUBLIN	94568	ALAMEDA
MARSHALL EARL P	M	7035	CANCELLED	251 SO LAKE AVE STE 107	PASADENA	91101	LOS ANGELES
MARSHALL EDWARD LEO	C	56749	CLEAR	1943 OAK GROVE RD	ATLANTA	30345	OUT OF STATE
MARSHALL EDWARD T	C	21219	CLEAR	P O BOX 1523	MILL VALLEY	94942	MARIN
MARSHALL EDWARD WILLIAM	C	38462	CLEAR	3815 SACRAMENTO DR	LA MESA	91941	SAN DIEGO
MARSHALL EDWIN LEE	FP	673	CANCELLED	1206 RIDGEWOOD DR	MILLBRAE	94030	SAN MATEO
MARSHALL EUGENE PAUL	C	26303	CLEAR	2641 STUART AVE	CLOVIS	93611	FRESNO
MARSHALL FENTON JR	SF	3171	CANCELLED	1001 EDISON AVE	MODESTO	95350	STANISLAUS
MARSHALL FRED C	C	6893	CANCELLED	8867 BLUFF LANE	FAIR OAKS	95628	SACRAMENTO
MARSHALL FRED CHARLES III	E	8845	CANCELLED	PO BOX 159	ILWACO	98624	OUT OF STATE
MARSHALL FREDERICK CARL	QU	1207	DELINQUENT	3060 SUNSET LANE	COCOA	32922	OUT OF STATE
MARSHALL GEORGE BUCHANAN	SF	1988	CLEAR	P O BOX 83	PORT JEFFERSON	11777	OUT OF STATE
MARSHALL GEORGE CHESTER JR	MF	392	CANCELLED	1010 MOAB DRIVE	CLAREMONT	91711	LOS ANGELES
MARSHALL GEORGE L JR	I	935	CANCELLED	40154 COLONY DRIVE	MURRIETA	92562	RIVERSIDE
MARSHALL GLENN DAVID	C	55070	CLEAR	538 NORTH EIGHTH ST	GROVER BEACH	93433	SAN LUIS OBISPO
MARSHALL GLENN NEILSON	C	24887	CLEAR	6600 SMOKE TREE COURT	CITRUS HEIGHTS	95610	SACRAMENTO
MARSHALL GLENY SPURGEON	C	25887	CLEAR	57 WILDFLOWER TRAIL	MURPHY	28906	OUT OF STATE

MARSHALL JACK ALAN	FP	828	DELINQUENT	3502 BLUE BLOSSOM DRIVE	MEDFORD	97504	OUT OF STATE
MARSHALL JAMES ALEXANDER	L	3815	CANCELLED	1814 VISTA DEL VALLE	ARCADIA	91006	LOS ANGELES
MARSHALL JAMES B	M	10548	CANCELLED	6 REYNA PLACE	MENLO PARK	94025	SAN MATEO
MARSHALL JAMES DONALD	C	55857	CLEAR	9023 ORCHID SHADE DR	EL DORADO HILLS	95762	EL DORADO
MARSHALL JAMES RICHARD	M	25503	CLEAR	2723 HEARNE	PASADENA	77502	OUT OF STATE
MARSHALL JOHN	NU	1460	CANCELLED	1036 JACQUELINE WAY	SAN JOSE	95129	SANTA CLARA
MARSHALL JOHN ADAM	I	3297	CANCELLED	5538 BRENTWOOD NORTHWEST	NORTH CANTON	44720	OUT OF STATE
MARSHALL JOHN E	C	15592	CLEAR	2709 10TH AVE	SACRAMENTO	95818	SACRAMENTO
MARSHALL JOHN G	M	2949	CANCELLED	17399 GRANDEE PLACE	SAN DIEGO	92128	SAN DIEGO
MARSHALL JOHN S JR	MF	3265	CANCELLED	79 BROOK FARM VILLAGE	ROCHESTER	038395616	OUT OF STATE
MARSHALL JOHN W	E	3452	CANCELLED	2123 BONITA DR	GLENDALE	91208	LOS ANGELES
MARSHALL JOHN W	M	7250	CANCELLED	2123 BONITA DR	GLENDALE	92108	LOS ANGELES
MARSHALL JOHN WEBSTER	M	13757	CLEAR	102 MISTFLOWER LN	GEORGETOWN	78633	OUT OF STATE
MARSHALL JONATHAN DAVID	E	17969	CLEAR	532 SE 20TH AVE	PORTLAND	97214	OUT OF STATE
MARSHALL JOSEPH ANTON	MF	1274	CANCELLED	12214 HUNTINGTON VENTURE DR	HOUSTON	77099	OUT OF STATE
MARSHALL JOSEPH W	M	7036	CANCELLED	1617 BEVERLY BLVD	LOS ANGELES	90026	LOS ANGELES
MARSHALL JUSTIN D	C	63229	CLEAR	432 SAUTNER DR	SAN JOSE	95123	SANTA CLARA
MARSHALL LEON SCOTT	CR	1073	CLEAR	2060 DEER ISLAND LN	WILMINGTON	28405	OUT OF STATE
MARSHALL LEON SCOTT	MT	1854	CLEAR	2060 DEER ISLAND LN	WILMINGTON	28405	OUT OF STATE
MARSHALL LLOYD L E	I	340	CANCELLED	1905 E FOOTHILL	GLENDORA	91740	LOS ANGELES
MARSHALL MARCUS DELANEY	E	10019	CANCELLED	11407 DEADOAK LN	AUSTIN	78759	OUT OF STATE

MARSHALL MATTHEW REED	C	35077	CLEAR	2948 ITHACA AVENUE	BOISE	83709	OUT OF STATE
MARSHALL MAURICE DONN	C	33300	CLEAR	605 MARSHALL COURT	CHICO	95973	BUTTE
MARSHALL NEIL ALBERT	CS	1954	CANCELLED	PO BOX 3844	ANN ARBOR	481063844	OUT OF STATE
MARSHALL NICHOLAS K	E	3327	CANCELLED	2207 PEACHLAND AVE	SEBASTOPOL	95472	SONOMA
MARSHALL PAUL ALLEN	C	51016	CLEAR	8725 GOLDY GLEN WAY	ELK GROVE	95624	SACRAMENTO
MARSHALL PAUL JEROME	E	8075	CANCELLED	6154 SIMPSON	ST LOUIS	63139	OUT OF STATE
MARSHALL PAUL ROBERT	C	46732	CLEAR	3501 SUNRISE BLVD STE 15	RANCHO CORDOVA	95742	SACRAMENTO
MARSHALL PAUL WELLINGTON	SF	3306	CANCELLED	8775 KILKENNY CT	ELK GROVE	95624	SACRAMENTO
MARSHALL PETER WAYNE	C	30021	CLEAR	934 WESTOVER AVE	NORFOLK	23507	OUT OF STATE
MARSHALL PHILIP THORNTON	C	43286	CLEAR	3751 LAKEVIEW ROAD	CARSON CITY	89701	OUT OF STATE
MARSHALL R W JR	M	6680	CANCELLED	4133 42ND AVENUE NE	SEATTLE	98105	OUT OF STATE
MARSHALL RENEE THERESE	CH	4867	CLEAR	12 DRAWBRIDGE CT	SACRAMENTO	95833	SACRAMENTO
MARSHALL RICHARD EDWARD	TR	1804	CLEAR	217 PEARWOOD AVE	ARROYO GRANDE	93420	SAN LUIS OBISPO
MARSHALL RICHARD EDWARD	C	47574	CLEAR	217 PEARWOOD AVE	ARROYO GRANDE	93420	SAN LUIS OBISPO
MARSHALL RICHARD WILLIAM	L	3904	CANCELLED	6446 GROSS AVE	CANOGA PARK	91304	LOS ANGELES
MARSHALL ROBERT L	M	10634	CANCELLED	10503 SO JULIUS AVE	DOWNEY	90241	LOS ANGELES
MARSHALL RODERICK	QU	4610	CANCELLED	10430 MOHAWK COURT	CYPRESS	90630	ORANGE
MARSHALL ROY FRANKLIN	C	22085	CLEAR	146 ACARI DR	LOS ANGELES	90049	LOS ANGELES
MARSHALL SAMUEL WILSON JR	C	31374	CANCELLED	3104 LOVERS LANE	DALLAS	75225	OUT OF STATE

MARSHALL SEAN ROBERT	C	58708	CLEAR	7054 WOODLAND AVE	PITTSBURG	15202	OUT OF STATE
MARSHALL STANLEY ROBERT	I	2233	CANCELLED	501 E ORANGETHORPE #41 PINE	ANAHEIM	92801	ORANGE
MARSHALL THOMAS A	M	7037	CANCELLED	17619 SO MAPES AVE P O BOX 283	CERRITOS	90701	LOS ANGELES
MARSHALL THOMAS JOSEPH	C	31214	CLEAR	119 SHAELAH CT	ST CHARLES	633040599	OUT OF STATE
MARSHALL THOMAS PAUL	M	25027	CANCELLED	21103 DUMETZ RD.	WOODLAND HILLS	91364	LOS ANGELES
MARSHALL TOMM DIXON	E	13085	CLEAR	1293 SETTLE AVE	SAN JOSE	95125	SANTA CLARA
MARSHALL WILLIAM DALLMAN	C	68755	CLEAR	2025 HOUNDSLAKE DR	WINTER PARK	32792	OUT OF STATE
MARSHALL WILLIAM HOWARD	L	8222	CLEAR	1120 PETRA CT	DAVIS	95618	YOLO
MARSHALL WILLIAM HOWARD	C	36852	CLEAR	1120 PETRA COURT	DAVIS	95618	YOLO
MARSHALL WILLIAM JOHN	C	25662	CLEAR	3807 HILLCREST LN	SACRAMENTO	95821	SACRAMENTO
MARSHALL WILLIAM LEROY	MF	1587	CANCELLED	P O BOX 4177	PAGOSA SPRINGS	81157	OUT OF STATE

Records 1 to 88

First Previous

Disclaimer

Back | Return to Main License Listing

G

Search Results for Professional Engineers and Professional Land Surveyors

This information is updated Monday through Friday - Last updated: JAN-21-2008

To see all the information for a licensee, click on the highlighted name. This will also include disciplinary actions if any are present.

Name	Type	Number	Status	Address	City	Zip	County
GIBSON ALDEN FESTEBERT	MF	2577	CANCELLED	1611 QUEENSTON ROAD CAMBRIDGE	ONTARIO	N3H 3M1	OUT OF COUNTRY
GIBSON ANDREW DOUGLAS	C	54153	DELINQUENT	658 BLUEFIELD DR	CLAREMONT	91711	LOS ANGELES
GIBSON ARVIN S	M	10940	CANCELLED	1412 VINEYARD DR	BOUNTIFUL	84010	OUT OF STATE
GIBSON BAYLOR PRICE III	GE	2061	CLEAR	3040 FAIRESTA ST	LA CRESCENTA	912142711	LOS ANGELES
GIBSON BAYLOR PRICE III	C	41568	CLEAR	3040 FAIRESTA ST	LA CRESCENTA	912142711	LOS ANGELES
GIBSON BRIAN LLOYD	QU	5199	DELINQUENT	6403 43RD COURT E	SARASOTA	34243	OUT OF STATE
GIBSON BRUCE BARKER	C	22359	CLEAR	2106 37TH ST	BELLINGHAM	98229	OUT OF STATE
GIBSON CARL HOLTON III	C	63399	CLEAR	9447 MISTY RIVER WAY	ELK GROVE	95624	SACRAMENTO
GIBSON CHARLES BERNARD	SF	156	CANCELLED	5041 BALSAM DRIVE S W	ROANOKE	24018	OUT OF STATE
GIBSON CLAIRE LOUISE	C	68091	CLEAR	5208 WOODLAWN AVE N	SEATTLE	98103	OUT OF STATE
GIBSON CURTIS LEE	M	28302	CLEAR	3329 AMBERFIELD CIRCLE	STOCKTON	95219	SAN JOAQUIN
GIBSON DANIEL K	E	6128	CANCELLED	1320 LODGEPOLE DR	HEMET	92343	RIVERSIDE
GIBSON DAVID R P	TR	685	CLEAR	4412 VANTAGE CT	ALEXANDRIA	223061238	OUT OF STATE
GIBSON FRANCIS EUGENE	MT	379	CANCELLED	PO BOX 29	PINON HILLS	92372	SAN BERNARDINO
GIBSON	M	6754	CANCELLED	136 CLUB DR	SAN CARLOS	94070	SAN MATEO

FRANK L							
GIBSON GEORGE RAYMOND	MF	944	CLEAR	28 MC CULLA AVE	BRAMPTON ONT PEEL	L6V 1L7	OUT OF COUNTRY
GIBSON GEORGE WILLIAM	MT	728	DECEASED	P O BOX 923	HAILEY	83333	OUT OF STATE
GIBSON GERALD LANCE	M	22057	CLEAR	11636 CALAMAR CT	SAN DIEGO	92124	SAN DIEGO
GIBSON GERALD N	C	13068	CLEAR	15086 MOSSWOOD LANE	GRASS VALLEY	95945	NEVADA
GIBSON GERALD NORWOOD	TR	1078	CLEAR	15086 MOSSWOOD LANE	GRASS VALLEY	95945	NEVADA
GIBSON GRANT GORDON	C	34695	CLEAR	4271 QUAIL RUN PLACE	DANVILLE	94506	CONTRA COSTA
GIBSON GREGORY WADE	C	59994	CLEAR	2159 6TH ST	LIVERMORE	94550	ALAMEDA
GIBSON IAN ALEXANDER	C	54959	CANCELLED	52 BRIGMORE	IRVINE	92612	ORANGE
GIBSON JAMES K	E	1633	CANCELLED	1333 JONES ST	SAN FRANCISCO	94109	SAN FRANCISCO
GIBSON JAMES KING	TR	612	CANCELLED	1333 JONES ST	SAN FRANCISCO	94109	SAN FRANCISCO
GIBSON JAMES WILLIAM	E	13199	CLEAR	6237 SE EQUESTRIAN DR	PORTLAND	97236	OUT OF STATE
GIBSON JOHN ROBERT	C	67200	CLEAR	4641 MATARO DR	SAN DIEGO	92115	SAN DIEGO
GIBSON KEVIN RAY	C	52295	CLEAR	706 SANTA BARBARA PL	SAN DIEGO	92109	SAN DIEGO
GIBSON LARRY SAWYER	CS	7113	CLEAR	21271 LOCHLEA LN	HUNTINGTON BEACH	92646	ORANGE
GIBSON LARRY SAWYER	E	15003	CLEAR	21271 LOCHLEA LANE	HUNTINGTON BEACH	92646	ORANGE
GIBSON LAURENCE ALAN	M	15657	CANCELLED	13820 S SPRINGS DR	CLIFTON	22024	OUT OF STATE
GIBSON LAWRENCE ALLEN	M	15954	CLEAR	11931 EMERALD ST	GARDEN GROVE	92845	ORANGE
GIBSON LLOYD MORGAN JR	L	4294	CLEAR	3431 WIEMILLER	TOLLHOUSE	93667	FRESNO

GIBSON LOUIS GEORGE	C	34696	CLEAR	PO BOX 12401	SAN LUIS OBISPO	93406	SAN LUIS OBISPO
GIBSON LUTHER JACKSON	CS	2829	CANCELLED	ROUTE #2 BOX 461	ANGELTON	77515	OUT OF STATE
GIBSON MARK ALAN	C	31688	CLEAR	1810 SPERRING ROAD	SONOMA	95476	SONOMA
GIBSON MARNELL L	C	50892	CLEAR	1763 REDONDO STREET	SAN DIEGO	92107	SAN DIEGO
GIBSON MARVIN PHILIP	C	22080	DELINQUENT	3765 NORTHLAND DRIVE	LOS ANGELES	90008	LOS ANGELES
GIBSON MATTHEW DWAYNE	C	67836	CLEAR	5208 WOODLAWN AVE N	SEATTLE	98103	OUT OF STATE
GIBSON MICHAEL W	M	26996	DELINQUENT	4234 ARBORWOOD LANE	TAMPA	33624	OUT OF STATE
GIBSON NATHAN DUANE	M	29337	DELINQUENT	14320 NW MEADOWRIDGE DR	PORTLAND	97229	OUT OF STATE
GIBSON NELSON SHERMAN	E	13268	CANCELLED	253 CO RD 73	FREMONT	43420	OUT OF STATE
GIBSON PATRICK ARTHUR	TR	545	CLEAR	505 COYLE AVENUE	ARCADIA	91006	LOS ANGELES
GIBSON PATRICK ARTHUR	C	23598	CLEAR	505 COYLE AVE	ARCADIA	91006	LOS ANGELES
GIBSON PAUL DAVID	M	24934	CLEAR	5670 OBERLIN DR	SAN DIEGO	92121	SAN DIEGO
GIBSON PETER WESLEY	C	36481	CLEAR	1745 MALLOW CT	CARLSBAD	92011	SAN DIEGO
GIBSON PETER WESLEY	L	5286	CLEAR	1745 MALLOW CT	CARLSBAD	92009	SAN DIEGO
GIBSON RASHOD JOSEPH	C	70999	CLEAR	1556 BORDER AVE UNIT G	CORONA	92882	RIVERSIDE
GIBSON RAYMOND	M	14618	CANCELLED	23 WALLACE WAY	SAN RAFAEL	94903	MARIN
GIBSON RAYMOND DUPREE	MF	3900	CLEAR	2422 CEDAR HILL DRIVE	KANNAPOLIS	28083	OUT OF STATE
GIBSON RICHARD WEST	SF	1952	CANCELLED	7058 CORONADO DR	SAN JOSE	95129	SANTA CLARA
GIBSON ROBERT	E	7406	CANCELLED	41 BRUBAKER DR	WALNUT CREEK	94596	CONTRA COSTA

EUGENE							
GIBSON ROBERT ZIMMERMAN	M	14266	DECEASED	3239 LIBBY WAY	SACRAMENTO	95821	SACRAMENTO
GIBSON SAMUEL FRANK	M	31516	CLEAR	23715 ALLIENE AVE	TORRANCE	90501	LOS ANGELES
GIBSON SCOTT DOUGLAS	C	65878	CLEAR	575 RIDGE ST	RENO	89501	OUT OF STATE
GIBSON SCOTT RANDALL	E	14133	CLEAR	373 BAILE DE CIERVOS	SANTA ROSA	95403	SONOMA
GIBSON SCOTT THOMAS	C	52296	DELINQUENT	8311 SW 3RD AVE	PORTLAND	97219	OUT OF STATE
GIBSON SIDNEY CHARLES	C	33029	CLEAR	2622 CINCINNATI ST	SAN BERNARDINO	92407	SAN BERNARDINO
GIBSON THOMAS RICHARD	E	10812	CANCELLED	402 ACADIA DR	JOPPA	21085	OUT OF STATE
GIBSON THOMAS WILLIAM	C	23661	DELINQUENT	5741 BRUSHTON ST.	LOS ANGELES	90000	LOS ANGELES
GIBSON VAN AUBREY	SF	1953	CANCELLED	6510 SE JACK RD	MILWAUKIE	97222	OUT OF STATE
GIBSON WARREN CRAIG	C	23599	CLEAR	P O BOX 88	SAN CARLOS	94070	SAN MATEO
GIBSON WILLIAM EDWIN	M	25402	CLEAR	PO BOX 97	MOCCASIN	95347	TUOLUMNE
GIBSON WILLIAM FAY	SF	1664	DELINQUENT	1513 W WATER ST	ELMIRA	14905	OUT OF STATE
GIBSON WILLIAM FRANK	C	50640	CLEAR	1763 REDONDO STREET	SAN DIEGO	92107	SAN DIEGO
GIBSON WILLIAM H	M	11465	CANCELLED	82 A NEWARK ST	AURORA	80012	OUT OF STATE
GIBSON WILLIAM JOSEPH	C	50154	CLEAR	3045 LUNADA LANE	ALAMO	94507	CONTRA COSTA
GIBSON WILLIAM LAVERN	E	12238	CLEAR	1330 WOODCREEK PL	OAKLEY	94561	CONTRA COSTA
GIBSON WILLIAM M	C	12348	CANCELLED	101 WILDWOOD AVE	PIEDMONT	94610	ALAMEDA
GIBSON WILLIAM R	C	15415	CLEAR	P O BOX A-80606	SAN DIEGO	92138	SAN DIEGO

GIBSON WILLIAM RANDOLPH	GE	340	CLEAR	1982 WHINCHAT STREET	SAN DIEGO	92123	SAN DIEGO
GIBSON WILLIAM RANDOLPH	TR	370	CLEAR	P O BOX A-80606	SAN DIEGO	92138	SAN DIEGO
GIBSON WILLIAM ROSS	QU	155	CLEAR	6017 WINDING WAY APT 108	CARMICHAEL	95608	SACRAMENTO
GIBSON WILLIE ROYCE	E	9289	CLEAR	5047 SOUTHRIDGE AVENUE	LOS ANGELES	90043	LOS ANGELES
GIBSON WINFIELD SCOTT	M	21306	DECEASED	17037 ADLON RD	ENCINO	91436	LOS ANGELES

Records 1 to 75

First Previous

Disclaimer

Back | Return to Main License Listing

H

smart mobility

about us

services & capabilities

representative project experience

project staff

how to find us

contact us

smart mobility

home

about us

services & capabilities

projects

staff

location

contact us

Smart Mobility, Inc. was established in 2001 as a consulting firm based in Norwich, Vermont that integrates transportation and land use modeling, engineering, and planning. The firm was founded by Norman Marshall, Brian Grady, and Lucinda Gibson, who together represent 40 years of experience in transportation modeling, engineering, design and planning. Norm and Brian specialize in developing advanced tools and techniques for travel demand modeling, regional air quality modeling, and analysis of land use/ transportation systems, with a goal of developing more meaningful indicators from regional transportation models. Lucy Gibson, P.E. has gained experience as a consultant and as a regional transportation planner, and specializes in sustainable transportation planning and project development that is responsive to environmental concerns, land use goals and current transportation policies and programs.

smart
mobility

Smart Mobility, Inc. offers customized services in the computer modeling and analysis of land use and transportation systems, and developing alternative conceptual designs to meet transportation needs. We use state-of-the-art, innovative techniques and tools that allow our clients to fully explore sustainable approaches to developing local and regional transportation plans or designing transportation projects. Services we offer include both regional-scale planning, modeling and analysis; and local area or corridor planning, as described below. We are experienced with a wide variety of advanced analytical tools for transportation and land use analysis, which can be used to best serve each client's needs.

Regional Modeling and Transportation Planning
Smart Mobility has particular strength and expertise in multi-modal regional transportation systems modeling that is truly unique for a small firm. We are leaders in enhancing regional travel demand models to accurately measure the effects of smart growth strategies at the regional level, and to test and evaluate different land use/transportation investment strategies. These include detailed evaluation of the impacts of alternative land use patterns on walking and walk-to-transit trips, and the influence of increased transportation capacity on travel ("induced travel"). In addition to the usual measures of congestion and delay, we have developed a meaningful set of regional transportation network performance indicators that focus on the environment, health, and other factors that are important to citizens and regional planners. Our clients have been able to use the results of these models to advocate for sustainable, smart growth strategies by showing their regional benefits. We are proficient in the use of software tools such as TransCAD, TP+/VIPER, ArcGIS, and LIMDEP/NLOGIT software.

Corridor and Local Area Planning, Engineering and Design
Our work at the corridor or local area level also includes bringing advanced tools and the latest traffic engineering

and operations research to develop concepts and plans to meet transportation needs. This area of work focuses on optimizing traffic operations while considering needs of all modes of transportation, and other community goals. This approach has gained acceptance with recent policy changes, encouraging a change in focus toward improving operations of existing roadway systems and designing road improvements to be more responsive to community needs and environmental concerns. In this new era of traffic engineering, we have been leaders in developing more sustainable, lower cost and lower impact plans to address future traffic needs. Our plans incorporate innovations such as roundabouts, traffic calming, and intelligent traffic signals. Among the tools we have available are HCM software, aaSIDRA and Rodel (roundabout design and analysis), CORSIM and VisSim Simulation software.

smart mobility

home

about us

services & capabilities

projects

staff

location

contact us

Chicago Metropolis 2020

The Commercial Club of Chicago, a prominent business and civic organization in the Chicago Area, undertook a planning and visioning process to address a number of longstanding concerns in the region, including sprawl, land consumption, equitable economic opportunity, and urban decay. The Chicago Metropolis Plan: Choices for the Chicago Region was released approximately 100 years after the famous Burnham Plan of Chicago, which was also an effort of the Commercial Club of Chicago. SMI has prepared alternative transportation networks and strategies and developed indicators to assess the system' s performance in mobility and environmental goals. More information available on the Chicago Metropolis 2020 web sites: www.chicagometropolis2020.org and www.metropolisplan.org

Envision Central Texas

SMI is part of a consultant team for this public/private partnership' s regional visioning project for the five-county Austin, Texas region, which is projected to grow from about 1.25 million people currently to 2.5 million people within 30 years. SMI' s work includes building a regional travel demand model that is more sensitive to transportation infrastructure and land use (both microscale and macroscale). It also includes developing transportation scenarios that are paired with four alternative land use scenarios, and evaluating these scenarios with performance measures including system capacity, system safety, and system reliability. More information on Envision Central Texas can be found at www.envisioncentraltexas.org

Baltimore Vision 2030

Smart Mobility is working with a coalition of organizations, including the Baltimore Metropolitan Planning Council, the Baltimore Regional

Partnership, the Chesapeake Bay Foundation, Environmental Defense Fund, the Urban League, and others to develop a future vision for the Baltimore area. Smart Mobility, Inc. is working with ACP Visioning and Planning, Inc., and has developed alternative future land use and transportation scenarios, modeled these scenarios, and prepared social and environmental indicators for each.

US 202 Alternative Plan

Working for several townships in Bucks County, Pennsylvania, SMI has prepared an alternative plan for improvement of National Highway System US 202 through the county, which is currently proposed to become a four lane expressway. Using the latest research on traffic engineering, a plan incorporating arterial traffic calming, new street connections, and roundabouts at some intersections has been prepared that will meet performance standards and better address community goals. Development of the plan included analysis of the area' s network of roads, and optimizing performance during the peak hour, while avoiding the negative effects of road improvements such as induced traffic and environmental impacts.

Route 41 Two Lane Plan

SMI is working with a concerned citizens group in Chester County, Pennsylvania, to develop and analyze a two-lane alternative plan to a proposed four-lane road widening project on a National Highway System route through a rural agricultural area. The plan incorporates many design features to allow for safe, efficient intersection operations, and compatibility with the community plans. Features such as roundabouts at major intersections and traffic calming in the historic village areas are included in the plan. This two-lane plan is proposed to be included in an ongoing Environmental Impact Statement for Route 41, being prepared by the Pennsylvania Department of Transportation. For more information see www.save41.org

Partial List of Clients

Audubon Naturalist Society
Baltimore Regional Partnership
Chicago Metropolis 2020
Chittenden County (VT) Metropolitan Planning Organization
Conservation Law Foundation
Environmental Defense

Environmental Law and Policy Center
Envision Central Texas
Neighbors for Bucks County Preservation
River Fields (Louisville, KY)
Safety, Agriculture, Villages and Environment (S.A.V.E.)
Sierra Club
Solebury Township (PA)
Town of Barnard (VT)

smart mobility

home
about us
services & capabilities
projects
staff
location
contact us

Norm Marshall, *President*
B.S. Mathematics, Worcester Polytechnic and M.S. Engineering Sciences, Dartmouth College. Mr. Marshall worked at Resource Systems Group, Inc. from 1987-2001 where he managed many transportation modeling and planning projects for governments at all levels, and for non-profit public interest groups. These include projects in over 20 different states, and work for the Federal government.

Lucinda E. Gibson, P.E., *Vice President*
B.S. Environmental Engineering, University of Vermont and M.S. Engineering Sciences, Dartmouth College. Ms. Gibson previously worked at Two Rivers-Ottauquechee Regional Commission as a Regional Transportation Planner, as well as at Resource Systems Group as a transportation analyst/engineer. She has gained a great deal of experience assisting municipalities and regions to articulate their future transportation goals and plans, re-shaping proposed transportation projects, and bringing constructive citizen input into the transportation project design process.

Brian Grady, *Treasurer*
B.S. Engineering Sciences, Bates College and B.E. Engineering Sciences, Dartmouth College. Mr. Grady worked closely with Mr. Marshall on many transportation planning projects while employed at Resource Systems Group before co-founding SMI. He has developed special expertise in mobile source air pollution modeling and travel demand modeling.

Jolyon Rivoir-Pruszinski, *Transportation Analyst*
B.A. Dartmouth College. Mr. Rivoir-Pruszinski is a transportation analyst, GIS specialist, and planner with SMI. He supports project work in the application and review of network models, analysis of infrastructure investment plans, estimation of travel demand, and review of environmental impact

statements.

smart mobility

Norman L. Marshall
nmarshall@smartmobility.com

Education
Master of Science in Engineering Sciences
Dartmouth College, Hanover, NH, 1982

Bachelor of Science in Mathematics
Worcester Polytechnic Institute, Worcester, MA, 1977

Professional Experience
Smart Mobility, Inc, Norwich, VT
President
November 1, 2001 - Present

Mr. Marshall helped found Smart Mobility, Inc. in 2001 and is its President. Since SMI's founding, Mr. Marshall has managed projects in the Chicago, Austin, Baltimore, Washington D.C., Louisville and other regions.

Resource Systems Group, White River Junction VT
Senior Associate, Area Director, Senior Project Consultant
October 1987 - October 2001
During his 14 years at Resource Systems Group, Mr. Marshall developed a national reputation for innovative work in regional travel demand modeling and transportation/land use interactions. His experience includes developing travel demand models for Burlington Vermont, Portland Maine, Syracuse New York, the New Hampshire Seacoast region, and a statewide model for Georgia. He has completed many projects in Vermont covering areas including estimating traffic volumes, traffic operations, traffic impact studies parking, transit needs, and transit operations.

Relevant Projects *(Partial List)*
State Routes 5 & 92 Scoping Phase - evaluating Transportation Systems Management (TSM), Transportation Demand Management (TDM), transit and highway widening

alternatives for the New York State Department of Transportation using local and national data, and a linkage between a regional network model and a detailed subarea CORSIM model.

Trip Generation Characteristics of Multi-Use Developments - estimated internal vehicle trips, internal pedestrian trips, and trip-making characteristics of residents at large multi-use developments in Fort Lauderdale, Florida.

L&M Park, South Burlington, Vermont - evaluated impacts of a proposed mixed use development on an entire urban arterial corridor. As a result of the study, a mitigation strategy was adopted that included formation of a Transportation Management Association (TMA).

State Routes 5 & 92 Scoping Phase - evaluating TSM, TDM, transit and highway widening alternatives for the New York State Department of Transportation using local and national data, and a linkage between a regional network model and a detailed subarea operations model using CORSIM.

Memberships/Affiliations

Associate Member, Institute of Transportation Engineers
Individual Affiliate, Transportation Research Board

Recent Publications and Presentations

Chicago Metropolis 2020: The Business Community Develops an Integrated Land Use/Transportation Plan with Lucinda Gibson, P.E., Frank Beal and John Fregonese, presented at the Transportation Research Board's Conference on Planning Applications, Fort Lauderdale Florida, March 2003.

Evidence of Induced Travel with Bill Cowart, presented in association with the Ninth Session of the Commission on Sustainable Development, United Nations, New York City, April 2001.

Evidence of Induced Demand in the Texas Transportation Institute's Urban Roadway Congestion Study Data Set, Transportation Research Board Annual Meeting, Washington D. C: January 2000.

Lucinda Gibson, PE
lgibson@smartmobility.com

Education
Master of Science in Engineering Sciences
Dartmouth College, Hanover, NH, 1988

Bachelor of Science in Engineering
University of Vermont, Burlington, VT, 1983

Professional Experience
Smart Mobility, Inc, *Norwich, VT*
Vice President
November 1, 2001 - Present
Manages a variety of projects involving analysis of land use/ transportation interactions. Project focus areas include conceptual design of sustainable transportation solutions, regional transportation infrastructure planning and analysis, and review of projects and development of alternative projects in the NEPA process for municipalities or interveners. Project work includes developing alternative conceptual designs for future land use/transportation scenarios at a local or regional scale; transportation improvement cost analysis; conceptual design and analysis of transportation and transit facilities, and impact assessment for transportation projects. Current clients include non-profit organizations, planning agencies and municipalities.

Two Rivers-Ottauquechee Regional Commission, Woodstock, VT
Transportation Planner
October 1994 - October 2001
Managed regional transportation planning program for a rural 27-town region in central Vermont. Prepared the Regional Transportation Plan, and prepared a regional Transportation Improvement Program for incorporation into the Vermont Statewide Transportation Improvement program. Implemented extensive public involvement program for transportation planning and project

development; assisted communities in planning, conceptual design, and cost analysis of transportation improvements; conducted Scenic Byway and Bicycle/pedestrian planning and design studies; assisted municipalities in addressing traffic circulation, pedestrian transportation and parking issues in their downtown area plans. www.trorc.org

Resource Systems Group, White River Junction, VT
Engineer/Analyst
November 1988 - October 1994
Conducted and prepared numerous local and regional transportation planning, traffic impact assessment and feasibility studies at a transportation consulting firm based in Vermont. Duties included analyzing traffic data, preparing regional transportation plans, conducting transportation improvement feasibility studies, preparing conceptual transportation improvement designs.

Professional Certifications
Professional Engineer - P.E., Vermont Board of Professional Engineering, License #6133
Associate Member, Institute of Transportation Engineers (ITE)
Member, Congress for the New Urbanism, Transportation Planning Committee

Publications
Chicago Metropolis 2020:The Business Community Develops a Land Use/Transportation Plan, Presented at the ITE Conference "Building Livable Communities through Transportation", Fort Lauderdale FL, March, 2003.

Multimodal Systems Classification, Presented at the Annual Meeting of the Transportation Research Board, 1999, Washington, DC.

smart mobility

Brian R. Grady
bgrady@smartmobility.com

Education
Bachelor of Science in Engineering Sciences
Bates College, Lewiston, ME, 1998

Bachelor of Engineering
Dartmouth College, Hanover NH, 1999

Professional Experience
Smart Mobility, Inc, *Norwich, VT*
Treasurer
November 1, 2001 - Present
Mr. Grady is a founding member of Smart Mobility, Inc. He works on projects in transportation planning and traffic impact requiring the application and development of regional transportation network models. Mr. Grady has been actively involved in the review of network models, particularly as they relate to the air quality conformity determination process.

Resource Systems Group, White River Junction, VT
Associate
July 1999 - October 2001
Contributed to a variety of transportation planning, transportation modeling, and impact assessment studies, including the following partial list of projects:

Winooski Downtown Revitalization - developed CORSIM model of the downtown area to analyze the impact of new retail/office development and a new one-way circulation proposed to provide a more pedestrian friendly environment.

Airport Drive Relocation - added roadway and land-use detail to the existing Chittenden County travel demand model in order to analyze the impact of extending Airport Drive, which provides access to the Burlington International Airport.

Burlington One-Way Circulation Study - used the Chittenden County travel demand model to identify one-way street pairs for potential two-way conversion. A Level of Service analysis for 15 major intersections in the downtown area was conducted for the Department of Public Works.

Rochester Connector Road Study - used the Seacoast "Megamodel" to study the impacts of a proposed connector road linking two major arterials in Rochester, New Hampshire. A turning movement and select link analysis in TMODEL was conducted to determine which vehicle trips would shift onto the new connector road.

Reviewing Regional Transportation Models - reviewed air quality conformity determination analyses, long-term transportation plans and Environmental Impact Statements in Tempe, Arizona, Atlanta, Georgia, Houston, Texas, Las Vegas, Nevada, and Salt Lake City, Utah.

Highway Investments and Induced Demand Travel - under contract with the Environmental Protection Agency, determined the extent to which the overall transportation planning and 4-step modeling processes account for induced demand, and the extent to which the individual components of different transportation planning and modeling methodologies account for induced demand.

smart mobility

Jolyon Rivoir-Pruzinski
jrivoirp@smartmobility.com

Education
Bachelor of Science in Geography
Dartmouth College, Hanover NH, 2000

Professional Experience
Smart Mobility, Inc, Norwich, VT
Transportation Analyst
July 15, 2002 - Present
Mr. Rivoir-Pruszinski is a transportation analyst, GIS specialist, and planner with SMI. He supports project work in the application and review of network models, analysis of infrastructure investment plans, estimation of travel demand, and review of environmental impact statements.

HDR, INC, Portland, OR
Transportation Planner
November 2000 - June 15 2002

North Sound Connecting Communities Project, Commuter Rail Feasibility Study - For the proposed commuter rail line connecting the major communities along the I-5 corridor between Everett, WA and the Canadian border Mr. Rivoir-Pruszinski developed the model for estimating ridership demand, drawing on sketch level planning tools available through the NCHRP. He also evaluated potential station development sites for environmental constraints and infrastructure needs.

Cross-Cascades Corridor Project, WSDOT, Planning Division - For the development of a Spatial Input-Output transport model for the US 2 and I-90 corridor in Washington State, Mr. Rivoir-Pruszinski headed up the effort to define and code the multi-modal transport network for use with MEPLAN modeling software. He also managed the development of specialized GIS tools for analyzing and visualizing model data.

Port of Portland Marine Economic Impact Study, Container Transportation Cost-Benefit Analysis - This analysis quantifies benefits accruing to shippers in the Pacific Northwest using the Port' s container shipping facility. Mr. Rivoir-Pruszinski adapted the Linear Program Model used in the 'Breaching the Lower Snake River Dams' Study, and enhanced it using Visual Basic Programming for analysis of the similar multi-modal transport assignment issues.

Vancouver Rail EIS Environmental Justice Evaluation, WSDOT, Rail Division - Using efficient GIS analysis techniques, Mr. Rivoir-Pruszinski evaluated environmental justice concerns related to proposed rail corridor improvements to accommodate additional passenger train in the PNW Rail Corridor.

home

about us

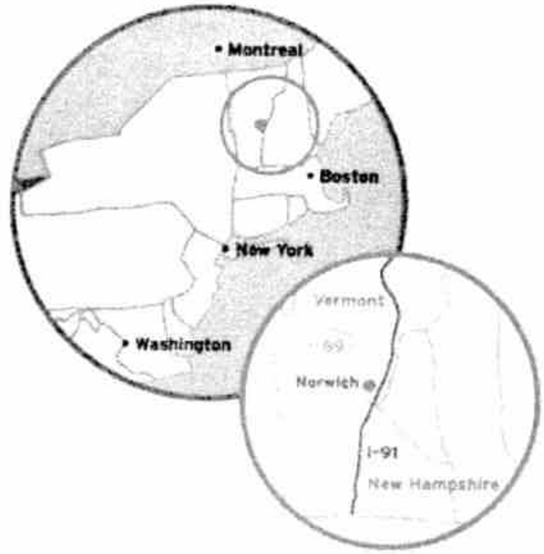
services & capabilities

projects

staff

location

contact us



Directions to our Office

Take I-91 to exit 13, Norwich, VT/Hanover, NH. Turn towards Norwich (turn right from I-91 southbound, or turn left from I-91 northbound), and stay on Main Street until you see the Norwich Inn on the left. Turn left onto Beaver Meadow Road immediately after the Norwich Inn. Our office is three buildings down on the right, in the Aldrich House at 16 Beaver Meadow Road. Our office is Suite #3, on the first floor.

smart mobility

Contact Us

address: Smart Mobility Inc.
16 Beaver Meadow Road
#3
PO Box 750
Norwich, VT 05055

phone: 802 649.5422

fax: 802 649.3956

e-mail: info@smartmobility.com

VERMONT SECRETARY OF STATE

Deborah L. Markowitz

Corporation Information

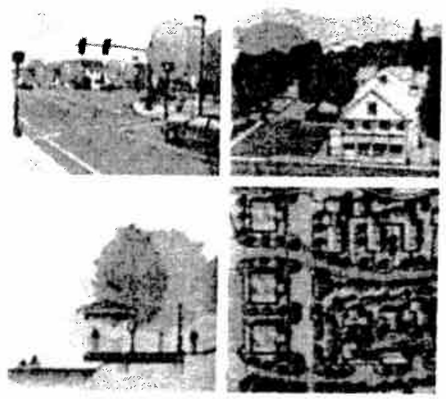
Corporation Name	SMART MOBILITY, INC.
Corporation Status	Active
File No	V-64388-0
Type	Vermont
Incorporation Date	10/17/2001
Corporation Description	CONSULT/TRANSPORTATION/COMMUNI
State of Incorporation	VT
Fiscal Month End	12
Registered Agent	NORMAN MARSHALL
Address	3280 ROUTE 5, PO BOX 150
City State Zip	EAST THETFORD VT 05043
President	LUCINDA GIBSON
Vice Pres	NORMAN L MARSHALL
Secretary	C NICHOLAS BURKE
Treasurer	BRIAN GRADY
Director1	SAME AS OFFICERS
Director2	-NONE ON FILE-
Director3	-NONE ON FILE-
Principal Street Address	16 BEAVER MEADOW RD, 3
City State Zip	NORWICH VT 05055
Last Annual Report	12/31/2006

Above accurate as of: 12/26/2007

OUR WORK WHO WE ARE NEWS CONTACT

TRANSPORTATION DESIGN

PLANNING



LANDSCAPE ARCHITECTURE

URBAN & VILLAGE DESIGN

ORW Landscape Architects and Planners is an interdisciplinary design firm located in Norwich, Vermont. We are committed to design solutions that promote a more sustainable environment and preserve the integrity of the natural and cultural landscape.

Robert White, ASLA
Landscape Architect

Bob is a Landscape Architect and founder of ORW. For nearly 20 years, Bob has been a leader in landscape architecture in Vermont, developing a broad range of work, including park design, trail and greenway planning and design, campus planning, village planning and transportation facility design. Through his work, Bob is frequently is involved in solving design challenges that are often closely interrelated with larger community planning issues. Bob graduated from Harvard's Graduate School of Design with a Master of Landscape Architecture degree.

Carolyn Radisch
Urban and Transportation Planner

Carolyn is a planner with national experience in urban and transportation planning. Her particular area of interest and expertise is the integration of land use with transportation systems, namely pedestrians and transit, in a manner that creates attractive public places. Carolyn has published research in the area of community design and mode choice, and strives to make alternative modes of transportation an attractive choice in neighborhoods and towns. She holds Masters degrees in City and Regional Planning and Civil Engineering, Transportation Engineering, from the University of California at Berkeley.

Jonathan Owens
Landscape Architect

Jonathan (a.k.a. Jake) is a landscape architect with particular experience in site design, building-to-site relationships, and the adroit integration of development into natural and historic contexts. At ORW, Jake leads most land planning and site design efforts, using experience gained in his work as an apprentice architect to achieve a careful integration of buildings into the landscape and townscape. Jake holds degrees in Landscape Architecture and Fine Arts from the Rhode Island School of Design..

Jennifer Claster
Associate ASLA, Landscape
Architect

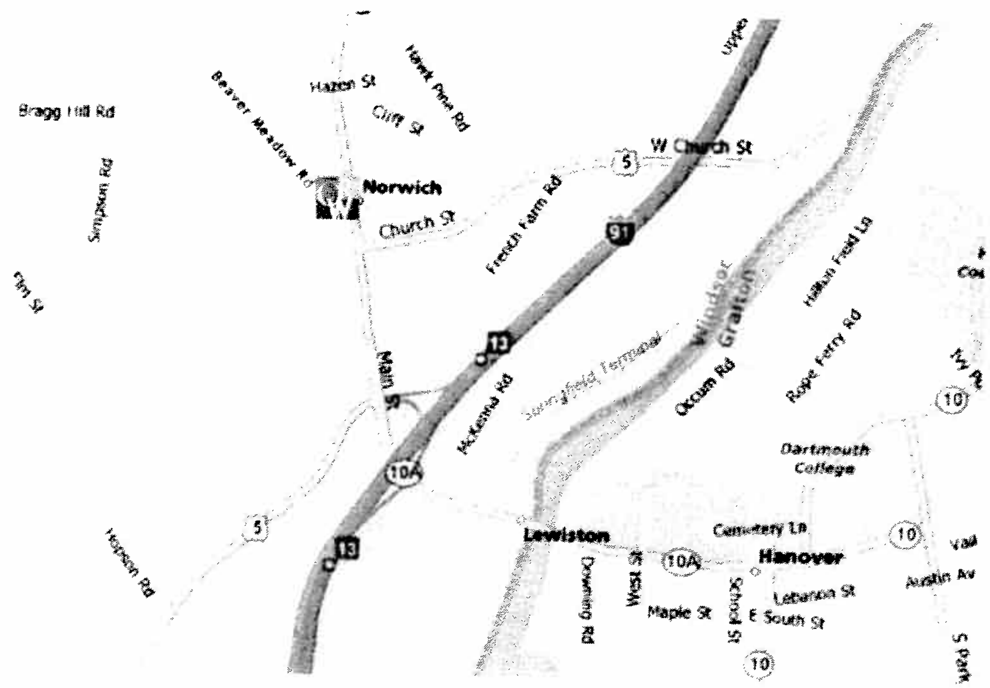
Jennifer is a landscape architect with experience in site design, planting design, landscape plan specification, and preparation of construction documents. Jennifer's varied experience in landscape construction as well as design make her particularly proficient in developing artful landscape and planting plans that are sound from a horticultural standpoint. Jennifer has a Master of Landscape Architecture degree from University of Massachusetts, Amherst.

OUR WORK WHO WE ARE NEWS CONTACT

ORW Landscape Architects & Planners
2 Beaver Meadow Rd.
P.O. Box 316
Norwich • Vermont • 05055
tel 802 649 2718fax 802 649 9020

Bob • bwhite@sveassoc.com
Jake • jowens@sveassoc.com
Caroline • cradisch@sveassoc.com
Jennifer • jclaster@sveassoc.com

is an office of SVE Associates
sveassoc.com



K

California Business Portal

Secretary of State DEBRA BOWEN

DISCLAIMER: The information displayed here is current as of JAN 11, 2008 and is updated weekly. It is not a complete or certified record of the Corporation.

Corporation		
CALIFORNIA STATE PARKS FOUNDATION		
Number: C0581544	**Date Filed:** 9/30/1969	**Status:** active
Jurisdiction: California		
Address		
800 COLLEGE AVENUE		
KENTFIELD, CA 94904		
Agent for Service of Process		
CATHERINE FISHER		
BELL, ROSENBERG & HUGHES, LLP		
1300 CLAY STREET, SUITE 1000		
OAKLAND, CA 94612		

Blank fields indicate the information is not contained in the computer file.

If the status of the corporation is "Surrender", the agent for service of process is automatically revoked. Please refer to California Corporations Code Section 2114 for information relating to service upon corporations that have surrendered.

Lai, Angela M.

From: Mark Delaplaine [mdelaplaine@coastal.ca.gov]
Sent: Thursday, September 27, 2007 1:49 PM
To: Levario, Maria
Subject: RE: FTP server instructions-CCC

Maria, the last one is a 120 p. September 2007 "Smart Mobility" Report that's too big to email. See if Nancy L can get it. If not, I'll try scanning it to see if I get the size down. Or break it into sections.

-----Original Message-----
From: Levario, Maria [mailto:levario@sjhtca.com]
Sent: Thursday, September 27, 2007 12:41 PM
To: Mark Delaplaine; Lucast, Nancy
Subject: RE: FTP server instructions-CCC

Hi Mark-

I can't get into this site. I am able to log in but when I click on "Toll Road" the screen reads, "Internet Explorer cannot display the webpage".

Any ideas?

Maria

-----Original Message-----
From: Mark Delaplaine [mailto:mdelaplaine@coastal.ca.gov]
Sent: Tuesday, September 25, 2007 5:37 PM
To: Levario, Maria; Lucast, Nancy
Subject: FW: FTP server instructions-CCC

Maria and Nancy - I've put 3 items we've received for your attention in our north central ftp site, in the folder: "Toll Road" (not the SOCTIIP folder).

Instructions below to get access to the site, and the password. If you can't get in, email me back.
- Mark

-----Original Message-----
From: Mark Delaplaine
Sent: Tuesday, April 24, 2007 2:57 PM
To: Mark Delaplaine
Subject: FW: FTP server instructions-CCC

To access the FTP Server, type or click:

ftp://username@ftp.coastal.ca.gov

By clicking on the link above, Internet Explorer browser will open.

Type the user name: northcentral (if it's not automatically there)

and password: ncentral.

Once inside the FTP site, you can COPY and PASTE files into it.

M

An Alternative to the Proposed Foothill South Toll Road

The Refined AIP Alternative

Design Modifications to Reduce Displacements

Prepared by:

Smart Mobility, Inc.

In Collaboration with:

Philip Williams & Associates, Ltd.
ORW Inc.
Oman Analytics

Revised
January 2008

smart mobility

PWA
PHILIP WILLIAMS & ASSOCIATES, LTD
ENVIRONMENTAL HYDROLOGY

ORW

TABLE OF CONTENTS

List of Figures

List of Tables

INTRODUCTION

For years, the Foothill/Eastern Transportation Corridor Agency ("TCA") has claimed that sacrificing wildlife habitat and a popular state park for a new toll road is the only way to get traffic relief in south Orange County. However, this study shows that TCA is wrong. Feasible, sensible alternative approaches are available that can provide similar traffic relief without destroying either huge expanses of habitat or large numbers of homes and businesses.

The basis for TCA's claim was that environmentally superior alternatives involving improving existing roads – for example, expanding the Interstate 5 and improving parallel surface streets – would require the destruction of over 1,200 existing residences and businesses. Consequently, TCA claims that a highway through the heart of open space preserves, a four-mile section of San Onofre Beach State Park, and a rare mosaic of coastal habitat types is actually the most environmentally sensitive feasible alternative. Yet TCA has never supported these conclusions with adequate analysis.

This report, prepared by a team of nationally recognized experts in the fields of transportation planning, traffic engineering, transit planning, hydrological engineering, and economic planning, explains why parks and sensitive coastal habitat need not be destroyed to get the traffic relief the toll road is advertised to bring. The TCA's own analysis shows that adding a carpool lane on either side of the I-5–from just south of the El Toro interchange to the County line–and making certain improvements to surface streets would give south Orange County drivers traffic benefits similar to the toll road. Moreover, using state-of-the-art, context-sensitive highway and interchange designs in the construction of this alternative could potentially reduce its cost by $1 billion – and reduce the displacement of existing homes and businesses by about 95% (from 1,237 to less than 70) – in comparison to TCA's estimates.

What does this mean for the toll road project? It means that environmentally superior alternatives that the TCA summarily rejected as infeasible and cost prohibitive are actually feasible and cost competitive. It means that a State Park and other ecologically sensitive habitat need not be destroyed to achieve the project's traffic benefits. It means that the most critical argument supporting the toll road – that there is no other way – is at best premature and at worst flawed.

How do we know that the carpool lane/surface street alternative will produce similar traffic benefits as the toll road? Put simply, TCA says it will. In their 2003 study modeling the toll road's effect on regional traffic, TCA's traffic consultants concluded that an alternative functionally similar to the alternative described in this report (the AIP alternative) performed as well or better than any of the toll road alternatives (including the one TCA selected) in reducing congestion on the I-5, in reducing regional congestion, and in reducing overall vehicle hours traveled.

How do we know that the carpool lane/surface street alternative is environmentally superior? Once again, TCA's analysis says so. Aside from the obvious fact that the AIP alternative almost completely avoids sensitive biological resources and totally avoids San Onofre Beach State Park, the TCA in its own environmental analysis conceded that the AIP alternative was environmentally superior.

How did the TCA come up with such a large number of business and residential displacements (1,200) where this report suggests only about 70? An exhaustive review of available background studies did not reveal analysis supporting the TCA's conclusion that the AIP alternative would cause extensive, unavoidable displacement of homes and businesses. However, upon examination, many of the property takings suggested by TCA are unnecessary. It also is apparent that the design options selected by TCA were chosen without effort to avoid impacts on the existing built environment. As a result, large stormwater detention basins (for water pollution control) and extensive "cloverleaf" interchanges were utilized with little regard to these designs' impact on nearby structures. These designs resulted in unnecessary impacts to nearby properties.

By contrast, the "context sensitive" approach used in this report– an approach endorsed by CalTrans and federal highway authorities – requires exploration of more refined design options that take into account the limitations and challenges posed by existing development. We have developed feasible design options that are consistent with these constraints and with sound engineering principles. Additionally, we made extra efforts to locate detention basins and other water quality facilities where they would function hydrologically without affecting existing development. Similarly, we have proposed interchange designs that will provide the needed capacity, but minimize the use of land. Similar approaches are used all over the country by highway designers faced with the challenge of increasing highway capacity in already urbanized areas.

How do we know that the refined AIP alternative, described in this report, will work? As stated above, the traffic performance of the carpool lane/surface street improvement alternative we propose has been validated by TCA's consultants. While some refinements have been made to interchange and intersection design, these do not alter the modeling results of the "AIP Alternative" produced for TCA by Austin Faust and Associates in 2003. As for the interchanges, one of the considerations for the recommended designs was to accommodate the TCA's estimates of projected volumes on each interchange assuming an expanded I-5. Further design refinements (e.g. signalization adjustments) can be included in later stages of design as needed.

Is the AIP alternative the final answer to South Orange County's traffic problems? There is no one single answer to accommodating traffic growth in South Orange County. What can be said is that this alternative is equally or more effective than the toll road in resolving traffic congestion, without the huge and permanent loss of irreplaceable environmental and recreational resources that the toll road would cause. Tolerating such losses should arguably not be even a last resort, much less an expedient one, as TCA proposes. Less damaging feasible alternatives, such as the Refined AIP alternative, should be adopted first.

METHODOLOGY

Smart Mobility, Inc. began its analysis by reviewing the publicly available materials of the Foothill/Eastern Transportation Corridor Agency (TCA) to support their analysis of alternatives to the SOCTIIP project, including the AIP alternative. The TCA's analysis concluded that the AIP alternative was infeasible because it would require the displacement of over 1230 existing homes and businesses.

It soon became apparent that TCA made no effort to look for solutions that accommodated the project within the existing built environment without substantial displacements. There was no documentation describing or justifying the design features included in the TCA's AIP alternative that resulted in high numbers of displacements. TCA's cursory examination of this issue was inadequate to conclude that the AIP alternative was infeasible due to property impacts, as there was no investigation of alternatives. TCA's initial design concepts, included in the DEIR, seem to reflect the "ideal" design in terms of traffic engineering, but were not refined to account for the unacceptable impacts that these designs would result in. Good engineering practice includes evaluating and analysis of alternative strategies, as in nearly every engineering design decision, there are trade-offs between an ideal engineering solution and a solution that balances safety, traffic capacity, and the community and context. TCA has reported the property impacts that would result from the ideal engineering solution, but not from alternative designs that would still be safe and effective yet greatly reduce property impacts and be more acceptable to the impacted communities.

The purpose of this report is to describe and illustrate engineering design concepts that can be used to avoid property impacts and displacements. This report does not provide detailed engineering specifications of the AIP alternative. The concepts recommended in this report are based on a review of the data presented in the TCA's SEIR, consideration of site conditions, and engineering judgment on the applicability of these concepts to the I-5 and arterial corridors. They represent a level of design sufficient to conclude that they will have far fewer property impacts, and that the AIP-R warrants further engineering analysis and design. The concepts presented here have worked in other similar locations, and can be designed to operate safely and efficiently for the traffic volumes in the TCA report. These design concepts will require full engineering analysis in order to develop more detailed design, and to precisely determine the final number of property displacements.

The process for completing this report included the following:

- Review of the TCA documentation of the design of the AIP alternative, to the extent it existed, including reported property takings.
- Five-day site visit to the project area.
- Develop conceptual designs consistent with California Highway Design Manual, Orange County Long Range Plan, AASHTO and the other guidance documents.
- Prepare initial report describing the refinements to the AIP alternative that would avoid most of the property takings as reported by TCA. (released September, 2007)

- Prepare final revised report with revisions based on input and comments received by TCA and others, as well as information made available to us since the initial draft; released January 2008.

The primary revisions to the design concepts described in the initial report include the following:

- I-5 travel and HOV lanes that were unintentionally omitted from consideration in the first report are now included, resulting in the refined AIP alternative that exactly matches TCA's AIP definition.
- El Toro Interchange is consistent with that proposed in TCA's AIP alternative
- Two new interchanges, south of El Toro and at Stone Creek, are included, and the displacements from the new interchange are included in our estimates
- Changes in the cross section of parallel arterials, including Avenida de la Carlota, Rancho Viejo Road, and Camino Capistrano are not included as design recommendations.
- The Crown Valley Interchange design has been revised to reflect comments from reviewers.
- Recommended design concepts for the I-5 interchanges at Avenida Pico and Ortega Highway recommendations reflect ongoing local studies.
- Recommended design concepts for arterial intersections at Antonio/Oso and Antonio/Crown Valley have been revised.

EXECUTIVE SUMMARY

As part of the Supplemental Environmental Impact Report ("SEIR") for the Foothill-South Toll road extension, TCA evaluated a number of project alternatives, including the Arterial Improvements Plus HOV Lane ("AIP") alternative. The AIP alternative consists of targeted widening of I-5 to add one additional HOV lane in each direction south of the El Toro interchange and auxiliary lanes in appropriate locations, and improvements to existing arterials, including expansion of Antonio Parkway/Avenida La Pata into a "smart street" of 6-8 lanes between Avenida Pico and Oso Parkway.

The SEIR concluded that the AIP alternative performed "well for traffic operating in congestion on I-5; moderately for hours of travel time savings; well in impacts to riparian ecosystems, CSS and gnatcatchers;" but that the project was eliminated "based on the very poor performance of this Alternative related to project costs and socioeconomics"[1].

The SEIR stated that the AIP alternative would require the acquisition of 898 housing units and 339 businesses, and would displace 2,208 persons and 4,000 jobs, with property acquisition costs of over one billion dollars. The Transportation Corridor Agencies rejected the AIP alternative from further consideration in the SEIR because of the projected costs for property acquisition and socioeconomic impacts to communities along the I-5 corridor, but there was no effort made to avoid these impacts through design refinements.

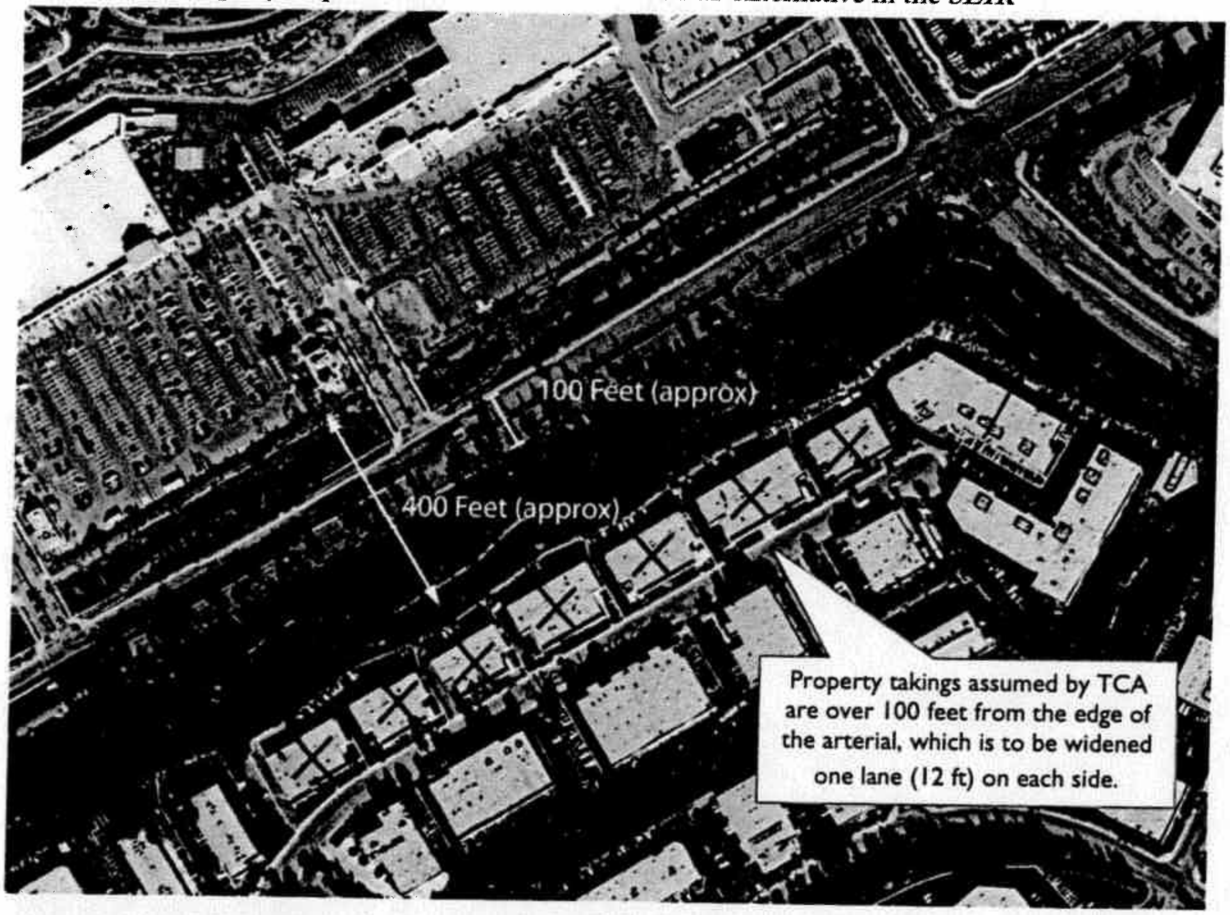
The purpose of this report is to explore whether the engineering design of the AIP alternative could be refined in order to minimize displacement of existing housing units and businesses and associated right-of-way acquisition costs.

SEIR Analysis Overstates Displacements

In the process of preparing this report, we reviewed the TCA information on the locations of displacements that would result from the AIP alternative. We found many instances of reported displacements for properties that were over 100 feet from the construction area. In other locations, there were clearly errors in the determination of property takings. This had led us to the conclusion that the property impacts and displacements reported by TCA for the AIP alternative were significantly overestimated and not reliable. Figure ES 1 below shows one example of a location where TCA's analysis assumes property impacts that appear to be unnecessary to construct the AIP improvements.

[1] Final SEIR Executive Summary, Foothill Eastern Transportation Corridor Agencies, Orange County, CA, November 2005, page ES-32.

Figure ES-1: Property Impacts on Avenida Pico for the AIP Alternative in the SEIR



A Refined Design Would Protect Homes and Businesses

Our refined design for the AIP alternative, described in this report as the "AIP-R", follows conventional engineering practice, including design guidelines established by the Federal Highway Administration (FHWA), the American Association of State Highway and Transportation Officials (AASHTO) and the Highway Design Manual (HDM) of the California Department of Transportation (CalTrans) for transportation projects in urbanized areas. The refined AIP ("AIP-R") alternative provides traffic benefits similar to the original AIP alternative, while avoiding nearly all of property takings identified in the SEIR.

The AIP-R alternative includes the following key design elements:

- Targeted widening of I-5 to add one additional HOV lane in each direction south of the El Toro interchange and auxiliary lanes in appropriate locations.
- Improvements to existing arterials, including expansion of Antonio Parkway/Avenida La Pata into a "smart street" of 6-8 lanes between Avenida Pico and Oso Parkway.
- Appropriately designed interchange improvements to alleviate congestion, consistent with current best practices in transportation design for urban locations.
- A refined Runoff Management Plan to address surface water.

Nearly all of the widening of I-5 and the arterials can be completed within the existing rights of way. A significant portion of the displacements noted in the SEIR for the AIP alternative resulted from interchange improvements and extended detention basins. Therefore, this report particularly focuses on developing alternative designs for these improvements that minimize impacts to property.

The design described in this report is estimated to avoid about 95% of the commercial and residential displacements identified in the SEIR with similar traffic congestion relief. The following table summarizes the estimated impacts.

Table ES1: Potential Displacements for the AIP-R Alternative by Community*

	Residential Units	Estimated Acquisition Cost	Commercial/Industrial Tenants	Estimated Acquisition Cost
Dana Point	16	$ 10,400,000	0	-
Laguna Hills	0	-	3	$ 4,125,000
Laguna Niguel	0	-	13	$ 17,875,000
Mission Viejo	1	$ 650,000	0	-
San Clemente	15	$ 9,750,000	16	$ 22,000,000
San Juan Capistrano	1	$ 650,000	3	$ 4,125,000
Total	33	$ 21,450,000	35	$ 48,125,000
Grand Total	68	$ 69,575,000		

* This table reflects revisions to account for discrepancies between the AIP-R lane configuration from the report, *An Alternative to the Proposed Foothill South Toll Road-The Refined AIP Alternative*, September 2007.

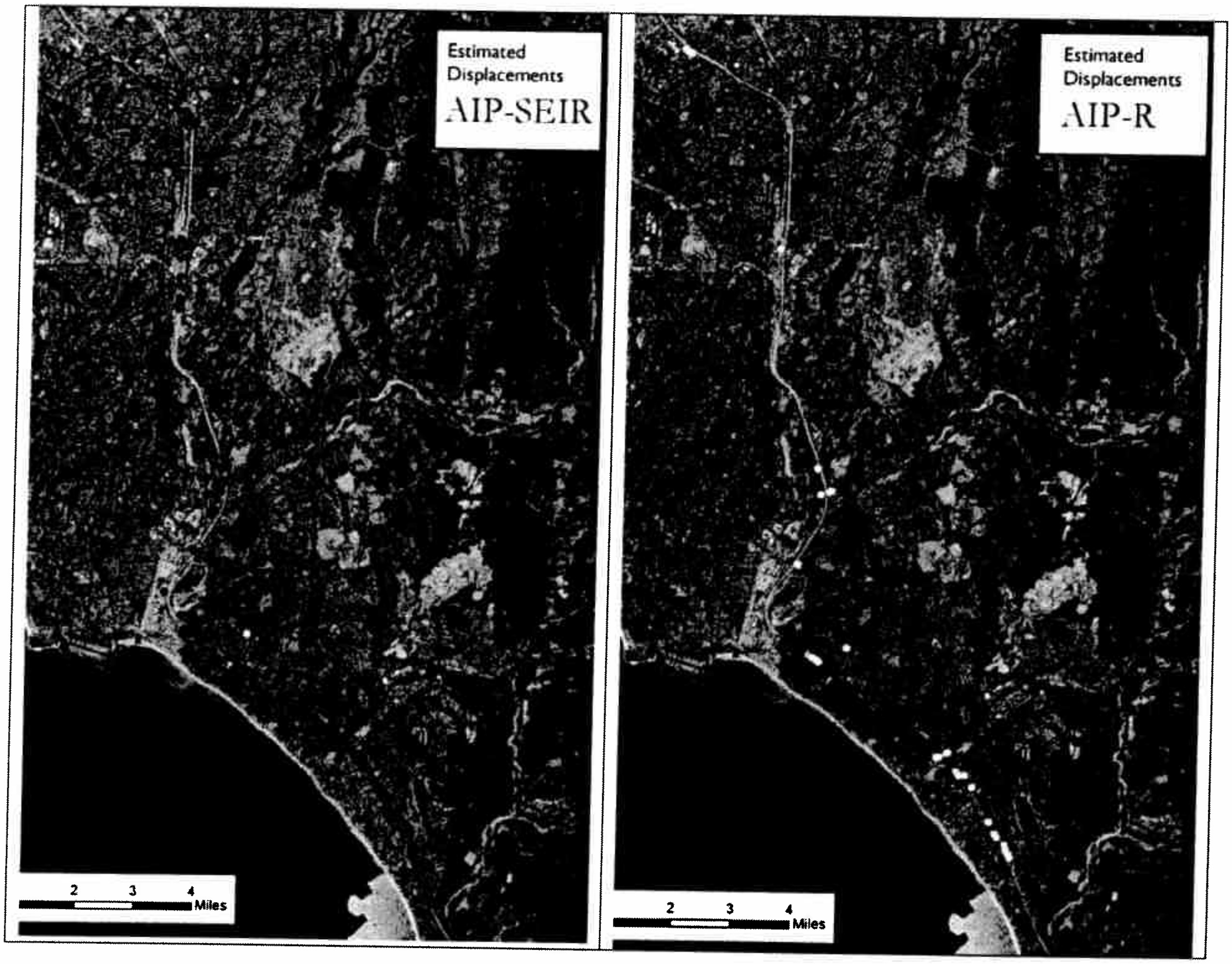
Table 6 compares to the costs of acquiring property with displacements for the AIP alternative as reported in the AIP-SEIR with the AIP-R. The following table only includes properties with displaced structures, which is consistent with the estimates in the SEIR.

Table ES-2: Comparison of Displacements in AIP-R with AIP-SEIR

Type of Property	AIP- SEIR Displacements	AIP-R Displacements	AIP-SEIR Acquisition Cost	AIP-R Acquisition Cost	Cost for AIP-R as percent of AIP- SEIR
Residential	898	33	$ 583,700,000	$ 21,450,000	3.7%
Commercial	339	35	$ 466,125,000	$ 48,125,000	10.3%
Total	1,237	68	$ 1,049,825,000	$ 69,575,000	6.6%

At this planning level, the AIP-R alternative is estimated to result in the displacement of 33 residential properties and 35 commercial tenants (in 22 buildings), with an acquisition cost of approximately $70 million -- only 6%, and nearly $1 billion less than, the AIP acquisition cost estimate provided in the SEIR. The design concepts presented in this report require full engineering and design studies, and the final number of impacts could alter through this process, but it appears that it will be at least an order of magnitude less than TCA's estimates.

Figure ES-2: Displacements of AIP-SEIR and AIP-R



AIP-R Provides Similar Traffic Benefits to TCA's Proposed Route through Park

The TCA's SEIR report concluded that the AIP alternative is more effective at reducing congestion on I-5 than the proposed toll road[2]. The modeling of the AIP Alternative showed that it will significantly reduce traffic congestion on I-5. In the "no action" scenario, 15.9% of the daily traffic on I-5 in the project area experiences congestion, which is reduced to only 2.2% with the AIP alternative. The toll road alternative is less effective at reducing traffic congestion on I-5 than the AIP alternative. In terms of reducing congestion on arterial streets, the AIP alternative also performs better than the toll road. Further, the AIP reduces the vehicle-miles-traveled (VMT) on the entire highway system for south Orange County from the "No Action" alternative, which means reductions in fuel consumption, energy use, and air pollution compared to the "preferred" toll road alternative.

The AIP-R alterative addresses the Purpose and Need of SOCTIIP as defined in the SEIR better than the proposed toll road alternative because it provides new roadway capacity and improvements where

[2] SOCTIIP Traffic and Circulation Technical Report, Austin Foust, December 1, 2003, p. 4-119 to 4-120.

they are most needed: along the I-5 corridor. The AIP alternative was eliminated from consideration only due to high property acquisition costs and impacts, as it was found to perform well for relief of congestion on I-5.

Conclusions

- At the planning design level of review, the AIP-R is a practicable, prudent and feasible alternative to the proposed Foothill South Toll Road that warrants further development and analysis by TCA.
- The AIP-Refined (AIP-R) alternative results in limited displacement when carefully designed to avoid private property, consistent with good engineering practice for designing transportation infrastructure in urbanized areas. This negates the primary reason for the rejection of the AIP alternative in the SEIR, impacts to private property.
- Based on SEIR data, the AIP-R alternative will have similar results the toll road in relieving I-5 congestion and performs similarly to the TCA tollroad extension of Route 241 in terms of regional travel time savings and other typical traffic performance measures.
- The design described in this report significantly reduces (about 95% based on preliminary estimates) the displacements identified in the SEIR without sacrificing performance.

ABOUT SMART MOBILITY

Smart Mobility was founded in 2001 by three partners with expertise and experience in transportation planning, modeling and engineering. The company has conducted transportation modeling and developed conceptual transportation designs for numerous projects across the United States for a variety of public and private clients. In several specific cases, Smart Mobility has contributed significantly to projects involving the context sensitive design of highways, including the Legacy Highway in the Salt Lake City area (currently under construction) and US 202 through Bucks County, Pennsylvania (in the process of being re-designed as a parkway). We are currently working with the City of Seattle, Washington to explore alternative strategies for the Alaskan Way Viaduct, a major urban highway along Seattle's waterfront. In the six years since its establishment, Smart Mobility has worked in over 25 states, with clients including state Departments of Transportation, City and County governments, Metropolitan Planning Organizations, and Non-Profit and Private clients. Specifically, Smart Mobility has worked for the following clients:

New York Department of Transportation, NY
King County Department of Transportation, WA
Douglas County Department of Public Works, CO
Bucks County Planning Commission, Doylestown, PA
Capital District Transportation Council, Albany, NY
Mid-Ohio Regional Planning Commission, Columbus, OH
Baltimore Metropolitan Planning Commission, Baltimore, MD
Chittenden County Metropolitan Planning Organization, Burlington, VT
Addison County Regional Planning Commission, Middlebury, VT
City of Seattle, WA
City of Milwaukee, WI
City of Flagstaff, AZ
City of Concord, NH
City of Lehi, UT
City of Burlington, VT
City of Montpelier, VT
Town of Lyme, NH
Town of Halfmoon, NY
Town of Shelburne, VT
Town of Essex, VT
Town of Norwich, VT

We have also worked for many private or non-profit organizations, including the following:

Institute for Transportation Engineers
The I-95 Corridor Coalition
The New England Transportation Institute
Dartmouth College, Hanover, NH
Congress for the New Urbanism
Chicago Metropolis 2020
Envision Central Texas

INTRODUCTION

This report is a revised final version of a report entitled, "An Alternative to the Proposed Foothill South Toll Road-The Refined AIP Alternative", dated September, 2007. After release of the September report, several discrepancies were noted between the AIP alternative as defined by TCA in their SEIR, and the AIP-R alternative. This was primarily due to our unintentional omission of planned HOV lanes along I-5 between the Pacific Coast Highway and the Avenida Pico interchange, and auxiliary lanes on the I-5 between Avenida Pico and Palizada, which were included in the AIP as defined in the SEIR, but erroneously not concluded in our first report. In addition, designs for several detention basins have been revised to reflect current site conditions, including new development that had been constructed since the original design was conducted.

Further refinements have been made for several interchanges and arterial intersections to reflect further input from reviewers and input from ongoing studies. Finally, we recently obtained some additional relevant information, including the specific locations of property takings for the AIP-SEIR, which allowed us to propose refined design concepts specifically for the locations where high numbers of displacements were projected by TCA. These changes have slightly altered the estimated impacts of the refined AIP alternative, but do not alter the overall conclusions that the AIP-R alternative offers an opportunity for traffic relief similar to that offered by the proposed toll road, without the severe and permanent environmental impacts of the proposed toll highway.

The primary revisions to the design concepts described in this report include the following:

- I-5 travel and HOV lanes that were unintentionally omitted from consideration in the first report are now included, resulting in the refined AIP alternative matching TCA's AIP definition.
- El Toro Interchange is now consistent with that proposed in TCA's AIP alternative
- A new interchange south of El Toro is included, and the displacements from the new interchange are included in our estimates
- Changes in the cross section of parallel arterials, including Avenida de la Carlota, Rancho Viejo Road, and Camino Capistrano are not included as recommendations for design refinements in this revised report.
- The Crown Valley Interchange design has been revised to reflect comments from reviewers.
- Recommended design concepts for the I-5 interchanges at Avenida Pico and Ortega Highway recommendations reflect ongoing local studies.
- Recommended design concepts for arterial intersections at Antonio/Oso and Antonio/Crown Valley have been revised.

The Foothill/Eastern Transportation Corridor Agencies (TCA) presents voluminous traffic modeling and analysis attempting to show that a new toll corridor is necessary to accommodate future traffic needs in South Orange County.[3] However, a close look at the numbers and analysis presented show that a refined series of arterial and I-5 improvements is a practical and cost-effective way to meet future traffic demand without construction of a new toll road corridor through open space and state parkland.

TCA rejected an alternative (the Arterial Improvements Plus or "AIP" alternative) from full consideration in the SEIR because of purported high displacement impacts and associated costs. The SEIR stated that the AIP alternative (AIP-SEIR) would require the acquisition of 898 housing units and 339 businesses, and would displace 2,208 persons and 4,000 jobs[4]. These conclusions were not supported by any description of the methodology or assumptions. Rather, merely a list of impacted properties was provided. In some areas, properties that are well over 100 feet from the construction limits of these improvements were reported as displacements, which leads us to conclude that the displacements reported in the SEIR were not indicative of actual impacts.

There is no evidence that TCA engaged in any effort to refine the design of the AIP alternative to avoid displacements, such as widening to one side where no displacements would result, or considering alternative interchange designs that avoid displacement but still provide needed capacity. These design techniques are good engineering practice and are commonly used, and in fact recommended, for proposed highway improvements in urbanized areas.

The design of the AIP-SEIR alternative can be refined to provide similar traffic benefits associated with that alternative with minimal displacement impacts and costs. This refined AIP alternative (AIP-R) represents a balanced approach, combining the addition of one HOV lane beyond those already planned on high-demand segments of I-5 with a set of arterial improvements. The arterial improvements include expanding of Antonio Parkway/Avenida La Pata to an eight-lane smart street from Oso Parkway to San Juan Creek Road and to a six-lane smart street from San Juan Creek Road to Avenida Pico. This report provides a description and conceptual drawings for AIP-R alternative of sufficient detail to demonstrate that the impacts to private property and required takings would be substantially reduced from those reported in the SEIR with a refined design.

AIP Alternative in the Draft SEIR

Among the alternatives considered in the final SEIR are the I-5 ("red"), that included adding 1 general purpose lane and 1 HOV lane in each direction throughout most of the study corridor; and the Arterial Improvements ("blue"), which involved improvements to the arterial network. However, the draft SEIR also included an alternative that combined elements of both. The combined alternative, known as the Arterial Improvements Plus HOV and Spot Mixed-Flow Lanes on I-5 or "AIP" alternative, utilized limited capacity expansion on I-5, which included an additional HOV lane in each direction on portions of I-5, "the addition of spot mixed-flow auxiliary lanes south of Ortega Highway and south of Avenida Pico, and the reconstruction of several existing I-5 interchanges." (TCTR, p. 2-23). It also included the same arterial improvements described in the Arterial Improvements Only ("AIO") alternative described in the SEIR. Specifically, they include:

[3] *Draft Environmental Impact Statement/Subsequent Environmental Impact Report and Draft Section 4(f) Evaluation for the South Orange County Infrastructure Improvement Project* (DEIS/SEIR), November, 2005; and the associated *Traffic and Circulation Technical Report* (TCTR), December, 2003.

[4] DEIS/SEIR, ES-16

> … the expansion of Antonio Parkway/Avenida La Pata to an eight lane smart street from Oso Parkway to San Juan Creek Road and to a six-lane smart street from San Juan Creek Road to Avenida Pico. In addition, Smart street technologies would also be included on Ortega Highway between Antonio Parkway/Avenida La Pata and I-5, Camino Las Ramblas between Avenida La Pata and I-5, and Avenida Pico between Avenida La Pata and I-5. Smart street technologies include a combination of advanced traffic management strategies such as traffic signal coordination, real time monitoring and surveillance, and traveler information, as well as modest physical improvements such as additional turn lanes at intersections. The effectiveness of providing grade separation at the intersections of Antonio Parkway/Oso Parkway, Antonio Parkway/Crown Valley Parkway, Antonio Parkway-La Pata Avenue/Ortega Highway, and Avenida La Pata/Avenida Pico will also be considered in the evaluation of the AIO Alternative. (TCTR, p. 2-19, 2-23)

The AIP alternative was rejected from full consideration in the SEIR for the reasons given in the paragraph below.

> <u>Arterial Improvements Plus HOV and Spot Mixed-Flow Lanes on I-5 (AIP) Alternative. The</u> AIP Alternative performed poorly in project costs and in cost per hour of travel time saved; well for traffic operating in congestion on I-5; moderately for hours of travel times savings; well in impacts to riparian ecosystems, CSS and gnatcatchers; and it displaces 898 residences. Based on the very poor performance of this Alternative related to project costs and socioeconomics, the Collaborative agreed to eliminate the AIP Alternative from consideration in the EIS/SEIR. (DEIS/SEIR, p. ES 16)

As the above paragraph indicates, the rejection of this alternative was based entirely on "costs and socioeconomics."

Traffic Performance of the AIP Alternative

Based on the SEIR's own data, the traffic performance of the AIP-SEIR alternative compares favorably with *any* of the toll road corridor alternatives proposed by TCA, whether the performance metric is reducing future I-5 congestion, reducing vehicle delay on the arterial system, or reducing total vehicle hours of travel. An earlier report prepared by Smart Mobility[5] describes the relative traffic performance of the AIP alternative with the tollroad alternatives and is included in Appendix 1. The conclusions of that report with respect to the key traffic performance metrics evaluated in the SEIR are summarized below.

Metric 1: Reduction of Future I-5 Congestion

The TCTR[6] considered projected 2025 congestion on I-5 in terms of *Percent of Daily I-5 VMT [vehicle miles traveled] in the Study Area Under Congested Conditions.* For the No Action alternative, the statistic is 16.9%. The values for the 11 new toll road alternatives range from 2.4% - 15.2%. *The AIP alternative outperforms all the new toll road alternatives, with only 2.2% of daily I-5 VMT operating under congested conditions in 2025.*

Metric 2: Vehicle Delay on Arterials

The TCTR also considered year 2025 arterial roadway congestion in terms of *Vehicle Delay on the Arterial System.* For the No Action alternative, the number is 9,944 hours of delay during the morning and

---

5 A *Practical, Cost Effective, and Environmentally Superior Alternative to the Foothills South Toll Road for the South Orange County Transportation Infrastructure Improvement Project*, Prepared by Norman L. Marshall, Smart Mobility, Inc. for the California State Parks Foundation, July 2005.

6 *Traffic and Circulation Technical Report* (TCTR), SOCTIIP, Austin Foust Inc., December, 2003.

afternoon peak traffic periods. The values for the 11 new toll road alternatives range from 7,677 to 8,708. *Again the AIP alternative outperforms all toll road alternatives, with a value of 7,589.*

Metric 3: Total Vehicle Hours Traveled

Finally, the TCTR analyzes total vehicle hours of travel (VHT) for the modeled area of impact. Compared to the No Action alternative, the 11 toll road alternatives reduce VHT by 0.01% to 0.16%. The AIP alternative is shown as reducing VHT by a comparable 0.08%. Thus, with the TCA's own traffic modeling, the AIP alternative performs comparably to the best performing toll road alternative within a *small fraction of one percent.* Even the best performing alternative shows insignificant changes to VHT, and the difference in VHT between that alternative and the AIP is even less significant.

Indeed, had TCA used standard modeling procedures for VHT, the AIP alternative would almost certainly have been shown to have greater VHT reductions than the toll road alternatives. TCA declined to employ universally accepted modeling procedures that take into account the effects of congestion on trip distribution by using "feedback loops" to provide a far more accurate projection of traffic impacts – despite TCA's acknowledgement that such modeling would reduce the traffic benefits of the toll road alternatives relative to the other alternatives. TCA's stated rationale for this decision was that the more accurate modeling would likely have shown a relative improvement in the performance of the AIP of *up to one percent* – a difference it described as "relatively minor." (TCTR, p. 1-10). But even a one percent difference *is over ten* times the difference between the best performing alternative and the AIP using TCA's own calculations.

In sum, the data provided by TCA indicates that a balanced set of arterial and HOV lane improvements on the I-5 would provide traffic benefits that overall are superior to those of the toll road alternatives.

Displacement Impacts and Costs

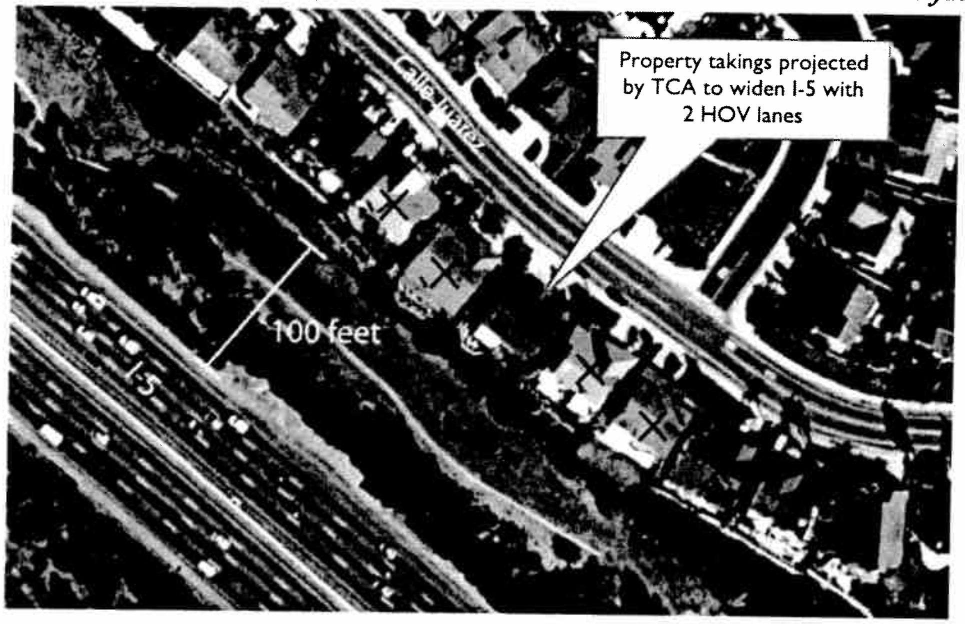
The SEIR rejected the AIP alternative as infeasible based on "project costs" and because it purportedly "displaces 898 residences." (DEIS/SEIR, ES-16) The costs are in large part due to the displacements, so the estimate of displaced residences is critical to the determination of this alternative's feasibility. The only documentation that exists, however, is a technical report entitled Draft Relocation Impacts Technical Report: Final (December 2003), which simply stated that the properties were counted if they fell within "limits of disturbance." This report does not describe how the area of disturbance was defined along existing roadways. Since the AIP alternative would generally require one- or two-lane widening on each side of I-5, the estimated displacements appear on their face to be unrealistically high. Several specific examples that follow illustrate that the TCA's projected property takings in the DEIS/SEIR for the AIP alternative are overestimated.

The first example of TCA's excessive or unreliable estimates of property takings is shown below in Figure 1, along the I-5 in Mission Viejo. The TCA assumed that all residential properties abutting I-5 on both sides would be taken for widening by just two lanes (12 feet on each side, or 24 feet total). A closer inspection of this cross section indicates that there is generally between 40 and 80 feet available on each side of I-5 between the edge of pavement and the property boundary, which should allow for widening without resulting in such high numbers of displacements. While there are elevation differences between the I-5 pavement and the residential properties, retaining walls are often are used in such locations to reduce the construction footprint.

Figure 1: TCA Projected Displacements at Cross Section C, Mission Viejo

Another example of TCA's excessive or unreliable estimates of property takings is shown below in Figure 2, along the I-5 in San Clemente between the Estrella and Vista Hermosa exits. In this segment, I-5 is currently about 144 wide, and would be 200 feet with the widening proposed in the AIP alternative. This includes adding 28 feet to each side for 2 HOV lanes plus a required buffer. As shown below, more than 100 feet is available between edge of I-5 and the backyard fence lines of homes along Calle Juarez, which is more than adequate for widening within right-of-way without taking residential property. However, the SEIR assumed that at least seven homes on Calle Juarez would be taken, as well as seven more along nearby Calle Frontera, which has nearly identical conditions.

Figure 2: Property Takings Assumed in SEIR AIP Alternative on I-5 at Calle Juarez in San Clemente

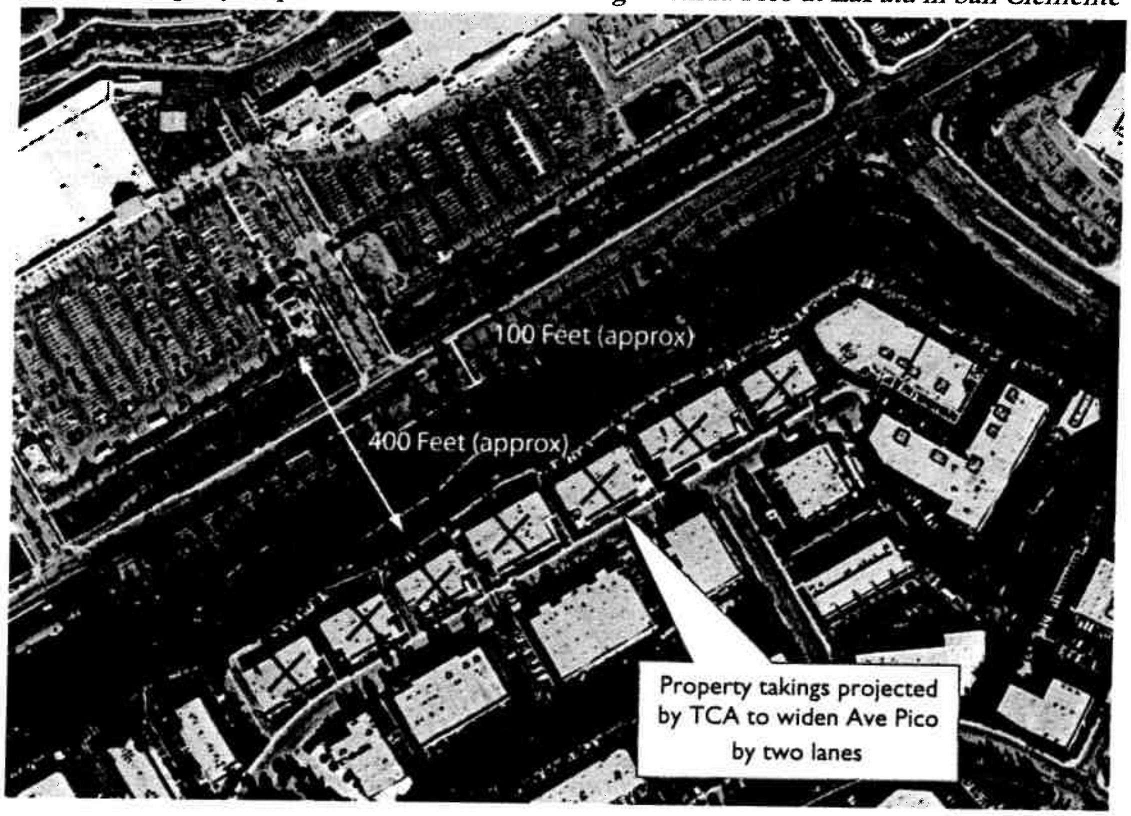


Yet another example, shown in Figure 3, is along the arterial Oso Parkway. In this section, TCA assumed residential displacements on both sides of the arterial. In fact, the buffer between the residential properties and the arterial right-of-way provides enough room for the proposed AIP improvements.

Figure 3: TCA Projected Displacements on Oso Parkway in Mission Viejo

Yet another example, shown in Figure 4, is along the arterial Avenida Pico in San Clemente. Avenida Pico currently has six through lanes, and the AIP alternative proposes to widen it to eight lanes. The current width of the road is about 100 feet on average (including medians and turning lanes), and would be about 124 feet after the proposed widening. The available right-of-way is about 400 feet, which provides ample room for this widening, as well as for the landscaping and pedestrian paths, without property displacements. Yet, the DEIS/SEIR has assumed that all of the commercial buildings located on Calle Negocio, shown in Figure 4, would need to be taken for this widening, even though they are more than 100 feet from the likely edge of construction.

Figure 4: Property Impacts for the AIP-SEIR along Avenida Pico at LaPata in San Clemente



The above are just four examples that provide evidence that the property displacements attributed to the AIP alternative in the SEIR are excessive. Therefore, the rejection of the AIP due to its property impacts was based on flawed information. Many of the improvements of the AIP alternative will simply not require the property takings reported in the SEIR. In other locations, refinements to the design of the AIP can greatly reduce or even eliminate displacement, such as widening on one side and shifting the centerline, narrowing frontage roads with low traffic demand to allow mainline freeway widening, use of retaining walls, alternative interchange designs, and locating stormwater facilities to avoid developed property. Such a refinement process is critical when working with the constraints of an urban environment.

The remainder of this report describes a set of mainline, interchange and arterial improvements that are similar to the AIP alternative with basic design refinements that maintain the AIP's traffic performance while avoiding most of the displacements identified in the SEIR.

DEVELOPMENT OF THE AIP-R ALTERNATIVE

The AIP-R alternative is based on a number of relevant documents and design guidelines. The basis for this alternative, referred to in this report as the AIP-SEIR, was first set forth in the SOCTIIP DEIS/SEIR, and was described in more detail in the *Traffic and Circulation Technical Report*[7]. Since the preparation of the SEIR, the Orange County Long Range Transportation Plan[8] now includes many of the components of the AIP alternative, including the completion of La Pata to Antonio Parkway, and the improvements along the I-5 corridor.

The following sections describe some of the documents that were used for guidance in refining the design of the AIP-R alternative. The concepts presented in this report are consistent with state, local and other relevant technical guidance.

AIP Alternative from SOCTIIP DEIS/SEIR

The AIP-R alternative includes the same improvements as described for the AIP-SEIR, but some of the specific design features are modified to reduce the impacts to private property. The following excerpt from the SEIR describes the AIP Alternative.

> **2.1.5.2 Arterial Improvements Plus HOV and Mixed-Flow Lanes on I-5 Alternative** The AIP Alternative, illustrated in Figure 2-15, assumes the same MPAH arterial enhancements described previously for the AIO Alternative as well as improvements along I-5 beyond the RTP. The I-5 improvements include the addition of one HOV lane in each direction from El Toro Road to south of Cristianos Road, the addition of spot mixed-flow auxiliary lanes south of Ortega Highway and south of Avenida Pico, and the reconstruction of several existing I-5 interchanges. The number of travel lanes in each direction on I-5 in the AIP Alternative is summarized in Table 2-1. The summary table also lists the existing lanes on I-5 and improvements that are under construction (i.e., committed) or are currently included in the RTP or in the *I-5 Route Concept Report* (CalTrans, April 2000) which is considered a subset of the RTP.[9]

The description above is supplemented by a table showing the additional lanes for each segment of I-5, which is reproduced in Table 1 later in this report. The "RTP" referred to in this description is the 2004 Orange County LRTP. Figure 5 reproduces Figure 2-15 from the Traffic and Circulation Appendix of the SEIR, which illustrates the AIP Alternative.

Orange County Long Range Plan

The following language from the 2006 *Orange County Long Range Transportation Plan*[10] describes improvements that are proposed for the I-5 corridor, many of which were also included in the AIP alternative, but were not specifically mentioned in the 2004 LRTP at the time of the SEIR's publication.

---

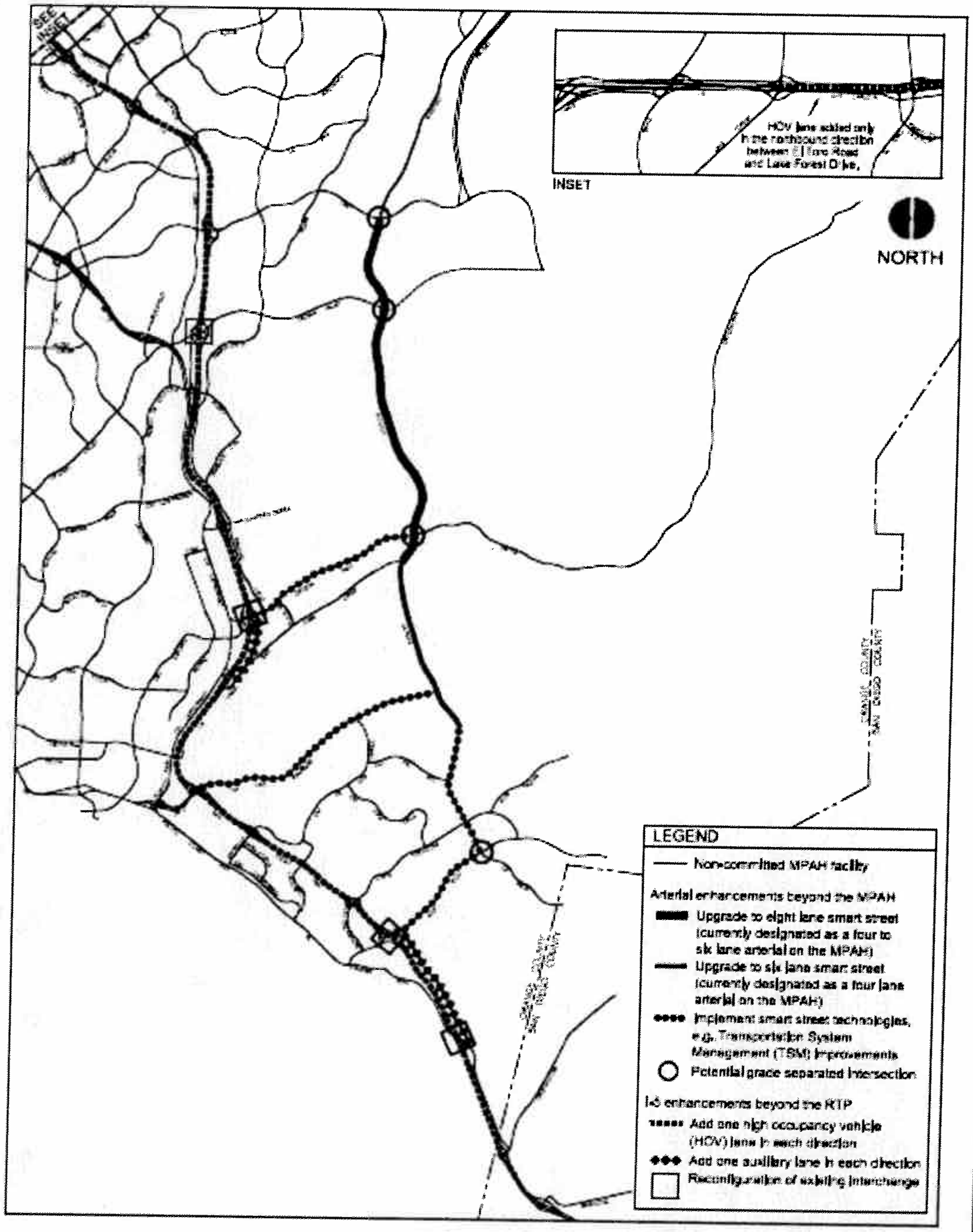
[7] *SOCTIIP Traffic and Circulation Technical Report (TCTR), Prepared by Austin Foust Inc., December 2003.*

[8] *New Directions-Charting the Course for Orange County's Future Transportation System*, Orange County Transportation Authority, 2006 Long Range Transportation Plan, July 24, 2006.

[9] TCTR, page 2-23.

[10] *New Directions-Charting the Course for Orange County's Future Transportation System*, Orange County Transportation Authority, 2006 Long Range Transportation Plan (LRTP), July 24, 2006.

Figure 5: AIP Alternative from the SEIR



Arterial Improvements Plus HOV and Mixed-Flow Lanes on I-5 Alternative

SOCTIIP EIS/SEIR
Traffic and Circulation Technical Report

Figure 2-15

176010TrafficReportFig2-15.dwg
December 1, 2003

Page 2-24

San Diego Freeway (I-5) Improvements South of the El Toro "Y"
Add new lanes to I-5 from the vicinity of the El Toro Interchange in Lake Forest to the vicinity of SR-73 in Mission Viejo. Also add new lanes on I-5 between Coast Highway and Avenida Pico interchanges to reduce freeway congestion in San Clemente. The project will also make major improvements at local interchanges. The project will generally be constructed within the existing right-of-way. Specific improvements will be subject to approved plans developed in cooperation with local jurisdictions and affected communities.

The project will increase freeway capacity and reduce congestion. Current traffic volume on I-5 near the El Toro "Y" is about 342,000 vehicles per day. This volume will increase in the future by 35 percent, bringing it up to 460,000 vehicles per day. Regional plans also include construction of a new freeway access point between Crown Valley Parkway and Avery Parkway as well as new off ramps at Stonehill Drive using federal and state funds.

Santa Ana Freeway/San Diego Freeway (I-5) Local Interchange Upgrades
Update and improve key I-5 interchanges such as Avenida Pico, Ortega Highway, Avery Parkway, La Paz Road, El Toro Road, and others to relieve street congestion around older interchanges and on ramps. Specific improvements will be subject to approved plans developed in cooperation with local jurisdictions and affected communities.

In addition to the project described above, regional plans also include improvements to the local interchanges at Camino Capistrano, Oso Parkway, Alicia Parkway and Barranca Parkway using federal and state funds. [11]

At the time that the SEIR was prepared, many of these improvements were not included in Orange County's LRTP, which contributed to the SEIR's conclusion that these improvements had no funding source. Since the SEIR was prepared, these improvements are now listed in the LRTP, which provides a much more likely path for funding than is suggested in the SEIR.

Further guidance for the design of the AIP-R alternative is provided in the OCTA LRTP Volume 1 document, on page 4.11-8 to 4.11-9, which describes possible socioeconomic effects from highway improvements and proposed mitigation approaches:

Mitigation Measures
4.11-B For projects with the potential to displace homes and/or businesses, project implementation agencies shall evaluate alternate route alignments and transportation facilities that minimize the displacement of homes and businesses. An iterative design and impact analysis would help in cases where impacts to homes or businesses are involved. Potential impacts shall be minimized to the extent feasible. Existing rights-of-way should be used to the furthest extent possible.
4.11-C Project implementation agencies shall identify businesses and residences to be displaced. As required by law, relocation assistance shall be provided to displaced residents and businesses in accordance with the federal Uniform Relocation and Real Property Acquisition Policies Act of 1970 and the State of California Relocation Assistance Act, as well as any applicable City, County, and port policies.
4.11-D Project implementation agencies shall develop a construction schedule that minimizes potential neighborhood deterioration from protracted waiting periods between right-of-way acquisition and construction.
Level of Significance after Mitigation
By providing relocation as required under State and federal law, Mitigation Measures 4.11-B through 4.11-D will reduce displacement impacts to less than significant levels.[12]

[11] LRTP, page 52.

The design proposed in the SEIR by the TCA clearly did not follow the above policy of iterative design to reduce impacts. The AIP-R Alternative was developed using the above approach to mitigation as described in the 2006 Orange County LRTP for mitigation of displacements.

AASHTO Green Book

Design guidance provided by the AASHTO Green Book[13] is primarily applicable to the construction of new highways. This book sets forth guidelines for new construction, and also allows the designer some flexibility in applying the guidelines. The companion document *Flexibility in Highway Design*[14] provides further guidance in balancing highway design principles with community resources. The major design components of the AIP alternative, such as lane width, conform to the AASHTO guidelines. The AASHTO manual does not, however, require upgrading of each component of an interstate facility, such as exit ramps, to comply with standards if the existing features are functioning safely and effectively.

CalTrans Highway Design Guidelines

The conceptual design plans presented in this report are consistent with all applicable CalTrans guidelines, such as lane width, median width, HOV buffer width, and other basic geometric features. The FHWA and many Departments of Transportation now have adopted policies and practices that encourage "context sensitive solutions" for highway design, defined as, "solutions [that] use innovative and inclusive approaches that integrate and balance community, aesthetic, historic, and environmental values with transportation safety, maintenance, and performance goals. Context sensitive solutions are reached through a collaborative, interdisciplinary approach involving all stakeholders."

CalTrans provides the following design guidance on their website:

> Highway Design Manual Philosophy:
> The Highway Design Manual philosophy mirrors the concepts of Context Sensitive Solutions. This philosophy for the project development process seeks to provide a degree of mobility to users of the transportation system that is in balance with other values. CalTrans policies, practices, or mandatory design standards provides a guide for highway designers to exercise sound judgment in applying the policies, practices, or standards consistent with this philosophy. This flexibility is the foundation of highway design and highway designers must strive to provide for the needs of all highway users in balance with the needs of the local community and the context of the project. CalTrans policies, practices or mandatory design standards allow sufficient flexibility in order to encourage independent designs that fit the needs of each situation.
>
> Application of Standards: The policies, practices or mandatory design standards used for any project should meet the minimum guidance given to the maximum extent feasible, but the philosophy provides for the use of nonstandard design when such use best satisfies the concerns of a given situation. Deviations from the CalTrans policies, practices or mandatory design standards requires review and approval for nonstandard design through the exception process (see Index 82.2 of the Highway Design Manual) and should be discussed early in the planning and design process.[15]

---

[12] *New Directions-Charting the Course for Orange County's Future Transportation System*, Orange County Transportation Authority, 2006 Long Range Transportation Plan, Volume 1, page 4.11-8 to 4.11-9, July 24, 2006

[13] *A Policy on the Geometric Design of Highways*, American Association of State Highway and Transportation Officials, 2004.

[14] *AASHTO Guide for Achieving Flexibility in Highway Design*, American Association of State Highway and Transportation Officials, 2004.

[15] California Highway Design Manual, http://www.dot.ca.gov/hq/oppd/context/index.htm accessed on 4/13/07.

The above excerpts indicate that it is appropriate (perhaps required) to consider the principles of CSS for the AIP improvements. However, the AIP-SEIR did not explore the full range of opportunities endorsed by the CSS approach. The resulting designs in the SEIR have very high impacts to the communities, which would be avoided by using CSS design techniques. The AIP-R is guided by the CalTrans CSS policy, which encourages the use of "independent designs that fit the needs of each situation."

CalTrans encourages the consideration of alternatives for interchanges, including the single point interchanges (SPI):

> Any SPI proposal must be compared to other conventional interchange types. Consistent with the philosophy of the PDPM, several interchange alternatives should be evaluated. The SPI alternative should be compared in particular to spread diamonds, L-9 partial cloverleaves (parclo) and tight diamonds. The type of interchange selected should be based on the discussions in these guidelines in order to select the best overall interchange configuration. [16]

CalTrans recognizes the potential of single point interchanges to provide higher capacity than tight urban diamond interchanges, and have a much smaller footprint than a partial cloverleaf. Design issues that need to be addressed for a single point interchange include coordination with the adjacent signalized intersections, and providing for the safe movements of bicyclists and pedestrians through the interchange.

ITE Freeway and Interchange Geometric Design Handbook

An additional source of relevant guidance is the *Freeway and Interchange Geometric Design Handbook* published by the Institute for Transportation Engineers (ITE)[17], which provides guidance to the relative benefits and appropriate application of different interchange types.

DESCRIPTION OF THE AIP-R ALTERNATIVE

The AIP-R alternative has the same I-5 lane configuration as the AIP-SEIR[18]. Both the AIP-SEIR and the AIP-R alternatives add an HOV lane in each direction between the El Toro interchange and the Orange/San Diego County line, beyond the HOV lanes already planned. In addition, auxiliary lanes are included in the AIP-R alternative in appropriate locations, consistent with the AIP-SEIR alternative. Table 1 on the following page describes the existing lane configuration for each segment of I-5, and the lane configuration for the AIP-R and AIP-SEIR alternatives.

Project Area Maps

Maps 1 through 9, attached to this report, show the approximate limits of impact for this proposed configuration, major design components such as new ramps, bridge structures, drainage basins and potential property takings. In general, the construction limits for the mainline widening lie within the I-5 right of way, and impacts to private property primarily occur at interchanges. The maps also show the proposed location of extended drainage basins.

[16] *Single Point Interchange Planning, Design and Operations Guidelines,* CalTrans Memorandum, June 15, 2001.

[17] *Freeway and Interchange Geometric Design Handbook*, Joel P. Leisch, P.E., Institute for Transportation Engineers, 2005.

[18] Discrepancies between the AIP-R and AIP-SEIR for the number of lanes on I-5 from the September 2007 report have been addressed in this revised report.

Table 1: I-5 Existing Lanes and Proposed Improvements by Segment for AIP-SEIR and AIP-R

Segment			Southbound			Northbound				
	From	To	Aux	GP	HOV	HOV	GP	Aux	AIP Improvements	Final Lane Configuration
A	Lake Forest	El Toro	0	6	2	1	6	0	NB HOV	0 - 6 - 2 - 2 - 6 - 0
B	El Toro	Alicia	1	4	1	1	5	1	NB HOV/SB HOV	1 - 4 - 2 - 2 - 5 - 1
C	Alicia	La Paz	1	4	1	1	4	1	NB HOV/SB HOV	1 - 4 - 2 - 2 - 4 - 1
D	La Paz	Oso	0	4	1	1	4	0	NB HOV/SB HOV	0 - 4 - 2 - 2 - 4 - 0
E	Oso	Crown Valley	0	4	1	1	4	1	NB HOV/SB HOV	0 - 4 - 2 - 2 - 4 - 1
F	Crown Valley	Avery	1	4	1	1	4	1	NB HOV/SB HOV	1 - 4 - 2 - 2 - 4 - 1
G	Avery	SR 73	0	4	1	1	4	0	NB HOV/SB HOV	0 - 4 - 2 - 2 - 4 - 0
H	SR 73	Junipero Serra	0	6	1	1	6	0	NB HOV/SB HOV	0 - 6 - 2 - 2 - 6 - 0
I	Junipero Serra	Ortega	0	5	1	1	5	0	NB HOV/SB HOV	0 - 5 - 2 - 2 - 5 - 0
J	Ortega	Camino Capistrano	0	4	1	1	4	0	NB HOV + Aux SB HOV + Aux	1 - 4 - 2 - 2 - 4 - 1
K	Camino Capistrano	Pac Coast Hwy (SR 1)	0	4	1	1	4	0	NB HOV/SB HOV	0 - 4 - 2 - 2 - 4 - 0
L	Pac Coast Hwy (SR 1)	Estrella	1	4	0	0	4	1	2 NB HOV/2 SB HOV	1 - 4 - 2 - 2 - 4 - 1
M	Estrella	Vista Hermosa	0	4	0	0	4	0	2 NB HOV/2 SB HOV	0 - 4 - 2 - 2 - 4 - 0
N	Vista Hermosa	Pico	1	4	0	0	4	1	2 NB HOV/2 SB HOV	1 - 4 - 2 - 2 - 4 - 1
O	Pico	Palizada	0	4	0	0	4	0	NB HOV + Aux SB HOV + Aux	1 - 4 - 1 - 1 - 4 - 1
P	Palizada	Presidio	0	4	0	0	4	0	NB HOV/SB HOV	0 - 4 - 1 - 1 - 4 - 0
Q	Presidio	El Camino Real	0	4	0	0	4	0	NB HOV/SB HOV	0 - 4 - 1 - 1 - 4 - 0
R	El Camino Real	Califia	0	4	0	0	4	0	NB HOV/SB HOV	0 - 4 - 1 - 1 - 4 - 0
S	Califia	Cristianos	0	4	0	0	4	0	NB HOV/SB HOV	0 - 4 - 1 - 1 - 4 - 0
T	Cristianos	Basilone	0	4	0	0	4	0	NB HOV/SB HOV	0 - 4 - 1 - 1 - 4 - 0

Source: Table 2-1, Summary of I-5 Improvements in the AIP and I-5 Alternatives, 176010TrafficReportSection 2.0.doc

The following sections discuss those locations in which the AIP-R identifies changes to the AIP-SEIR design with great potential to avoid or minimize displacement impacts. These include several interchanges, as well as several segments of I-5 in which changes to the cross sections of parallel frontage roads are proposed in order to accommodate the widening of I-5. Changes to the location and design of extended drainage basins are also shown and are discussed in greater detail in Appendix 2

Interchanges

Many of the interchanges on I-5 within the project area are congested and in need of improvement or expansion. Others are operating well in their current configuration, and can be adapted to work with the widened I-5 with relatively minor changes. The AIP-SEIR proposed complete reconstruction and reconfiguration of several interchanges, such as Ortega Highway and Avenida Pico, without consideration of ongoing local planning and design efforts for these interchanges. Many of the AIP-SEIR interchange designs involved construction of partial cloverleaf, or "parclo" Interchanges, which require a very large area, and are typically not appropriate for urban areas where displacement impacts are of concern.

Given the urbanized nature and high property values of southern Orange County, it is important to consider the full range of interchange design options that will provide acceptable levels of service, and balance performance with property impacts. Some interchange configurations can achieve desirable traffic operations with much smaller footprints, and are commonly used in urban areas. It is also appropriate to consider other design and construction techniques, such as retaining walls to tighten slopes, that are appropriate for the urban context and high property values in southern Orange County.

Table 2 lists the interchanges within the project area, and summarizes the original AIP design, and shows potential alternative designs for the AIP-R alternative. The interchange designs as shown for the AIP-R alternative provide sufficient capacity to serve the I-5 interchange ramp volumes cited in the SEIR, in particular on Table E-40 of Appendix E of the Traffic and Circulation Technical Report. This table provides the projected AM and PM peak hour volumes for each interchange ramp for the "design year" of traffic, 2025. These volumes are the basis for the design of interchanges, and indicate how much capacity, i.e. how many travel lanes, will be needed for each ramp. The design concepts presented in this report will provide sufficient capacity to accommodate the projected future traffic volumes in the SEIR.

Table 2: Interchanges on I-5 - Comparison of AIP-SEIR with AIP-R

	Street Name	Existing	AIP-SEIR Design	AIP-SEIR Displacement Impacts	AIP-R Modifications	AIP-R Displacements
1	El Toro	T SB, Diamond NB	No change Proposed.	None	No change Proposed.	None
2	Alicia	Parclo	Parclo with rectangular Detention Basin	Minimal	Parclo with re-shaped detention basin	None
3	La Paz	Parclo	Re-aligned Parclo	Minimal	Maintain existing ramp alignment	None
4	Oso	Parclo	Parclo	None	Parclo	None
5	Crown Valley	Diamond SB/parclo NB	Full Parclo	***High***	***SB Flyover/NB Parclo***	***Moderate***
6	Avery	Diamond	Interchange widening	Moderate	No change Proposed.	Minimal
7	SR 73	Flyover	Re-aligned Flyover	Moderate	Maintain existing alignment	Minimal
8	Junipero Serra	Diamond	No change Proposed.	None	No change Proposed.	None
9	Ortega	Diamond	Parclo	***High***	***Select alternative consistent with local plans***	***Moderate***
10	San Juan Creek	Double – T	Flyover	Minimal	Flyover	Minimal
11	SR 1/Pacific Coast Hwy	Parclo with NB flyover	Realignment of I-5 horizontal curve	***High***	Maintain existing alignment of I-5	Minimal
12	Estrella	Diamond SB/parclo NB	No change Proposed.	None	No change Proposed.	None
13	Vista Hermosa	Parclo	Re-align ramps	Minimal	Maintain existing alignment of ramps	None
14	Pico	Diamond	Parclo	***High***	***Select alternative consistent with local plans***	***Moderate***

15	Palizada	Slip ramps to and from north	No change Proposed.	None	No change Proposed.	None
16	Presidio	Slip ramps to and from south plus on-ramp to north	No change Proposed.	None	No change Proposed.	None
17	El Camino Real	Tight Diamond	Reconstruction and closure of Califia Ramps	***Very high***	***Close existing NB ramp, maintain existing sb ramps***	***Moderate***
18	Califia	Double T	Closure of ramps	None	Close sb, Maintain northbound ramps	Minimal
19	Cristianos	Diamond	No change Proposed.	None	No change Proposed.	None

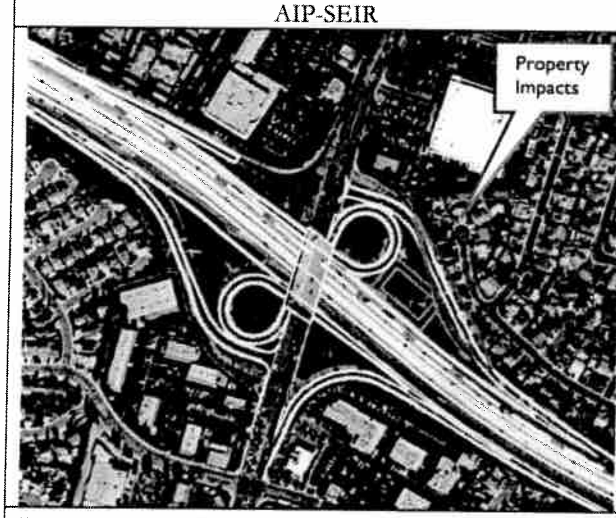
Displacements: Minimal = only minor property acquisition required, with no displacements of residential or commercial buildings.
Moderate = fewer than 10 displacements; High = 11 to 25 displacements; Very high = more than 25 displacements

The following sections discuss each interchange and provide illustrations comparing the designs of the AIP-SEIR and the AIP-R where substantial changes are proposed.

Alicia Parkway Interchange

This interchange is proposed to remain in its current general configuration, which is a partial cloverleaf (parclo). However, the AIP-SEIR places a large rectangular detention basin between the northbound ramp and mainlines, which creates the need to relocate the ramps into a residential area, resulting in property takings. The simple refinement of re-shaping the detention basin to fit within the cloverleaf allows the property takings to be completely avoided in the AIP-R alternative. Both alternatives are shown in Figure 6.

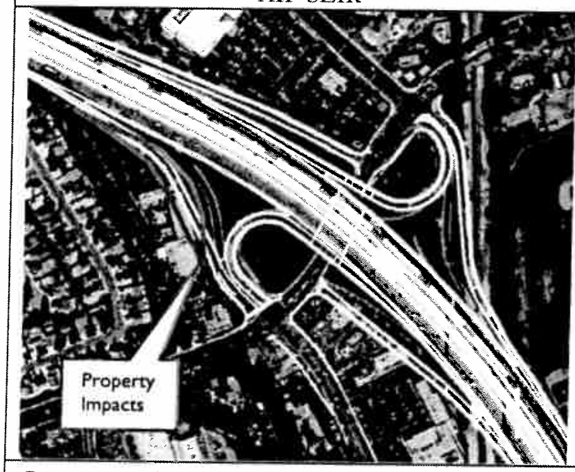
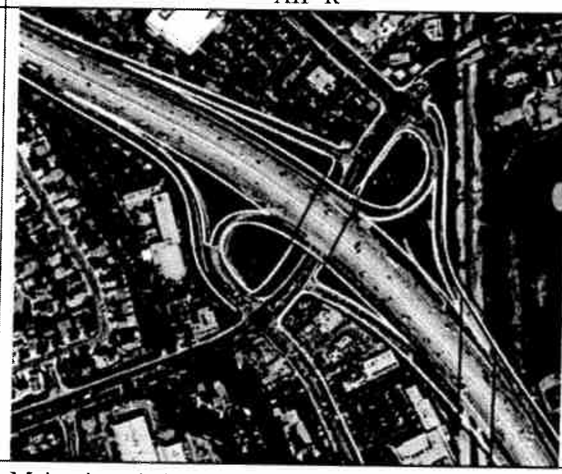
Figure 6: Alicia Parkway Interchange: AIP-SEIR and AIP-R

AIP-SEIR	AIP-R
	
Rectangular detention basin forces ramp into residential area, resulting in property takings.	Detention basin re-shaped to fit within interchange area, avoiding property takings

La Paz Road Interchange

This interchange has a par-clo ramp configuration. The AIP-SEIR plan modifies the geometry to provide for higher-speed ramps, which results in the taking of several commercial properties abutting the southbound ramps. However, the reconfiguration as proposed in the SEIR is not warranted, as the existing configuration has not resulted in safety or operations problems. The AIP-R plan includes maintaining the existing geometry of this interchange, with slight modifications to accommodate the additional lanes on I-5.

Figure 7: La Paz Road Interchange: DEIS and AIP-R

<table>
<tr><td>AIP-SEIR</td><td>AIP-R</td></tr>
<tr><td>
</td><td></td></tr>
<tr><td>Curvature of ramp is reduced, resulting in commercial displacements</td><td>Maintain existing interchange geometry; widen La Paz crossing to provide improved capacity.</td></tr>
</table>

Crown Valley Interchange

The AIP-SEIR proposed a major reconstruction to convert this interchange into a partial cloverleaf configuration, which results in significant takings of property along the southbound ramps, and impacts to an active railroad corridor. The AIP-R proposes two options for this interchange to be studied further. This first is a single point diamond interchange (SPDI), which essentially fits into the footprint of the existing interchange. This option would not require the taking of any existing buildings, but should be evaluated with detailed traffic forecasts to determine whether or not it would provide sufficient capacity. Another option, illustrated below in Figure 8, would be to maintain the existing partial cloverleaf ramp for the northbound I-5, and construct a flyover ramp for southbound left turns. The flyover ramp would first cross under Crown Valley Parkway approximately at the same grade as I-5, and then climb at approximately 5% grade to cross I-5 and join the northbound ramp

Figure 8: Crown Valley Parkway Interchange: AIP-SEIR and AIP-R

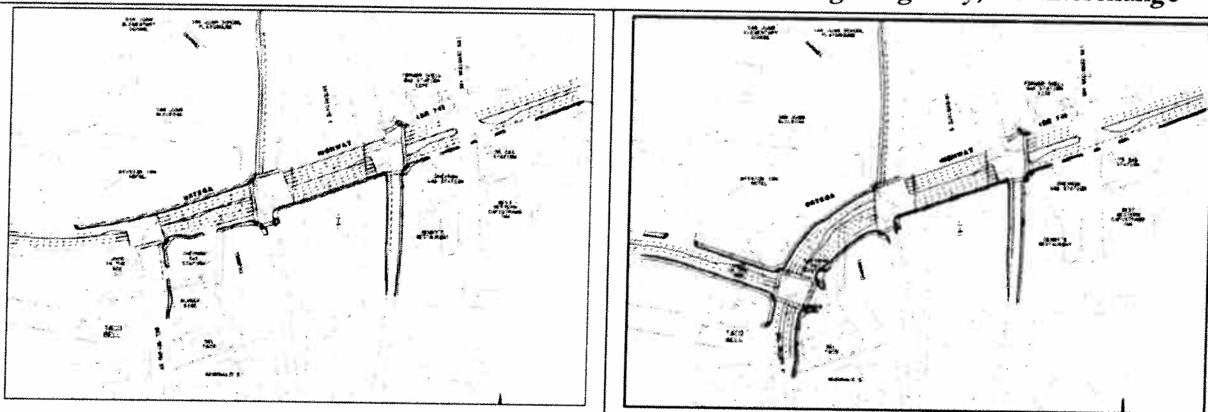
AIP-SEIR	AIP-R
	
Significant railroad impacts and property takings along the southbound lanes would result from the plan proposed in the SEIR.	The southbound flyover would require several structures, but would result in only minor property takings.

This concept is estimated to displace three commercial/industrial buildings. Redevelopment of these parcels would be possible, however, for other commercial development or a park and ride lot for commuters.

Ortega Parkway Interchange

This interchange is currently congested, and in need of additional capacity. Currently, the City of San Juan Capistrano is studying several alternatives with far fewer impacts. Figure 9 below show drawings from the City of San Juan Capistrano website[19] of two possible design concepts for this interchange that have been approved by CalTrans, and could be adapted for the AIP-R. Either one of the above alternatives will result in far fewer property impacts than those described in the SEIR, and can be adapted to the I-5 improvements included in the AIP-R.

Figure 9: Current Interchange Improvement Alternatives for the Ortega Highway/I-5 Interchange



ALTERNATIVE 1 | ALTERNATIVE 2

CalTrans approval of the above alternatives illustrates the design flexibility that is inherent in the "mandatory" standards when designing facilities in built-up areas. Neither of the above options meet the "mandatory" standard for distance between the ramp intersection and the nearest local road intersection, which is 125 meters. The drawings above have distances of about 60 meters.

Instead of the smaller footprint alternatives shown above, the AIP-SEIR proposes a large partial cloverleaf design for this interchange, shown in Figure 10 to the right. This is a highly inappropriate for this location, and results in massive impacts to private properties and community recreational resources. In fact, the SEIR states that the concept shown at right was considered by the City, but was not selected for further development. Therefore, the AIP-SEIR proposal for this interchange is inconsistent with local plans.

Figure 10: Ortega Parkway Interchange AIP-SEIR

[19] http://www.sanjuancapistrano.org/Index.aspx?page=398

Avenida Pico Interchange

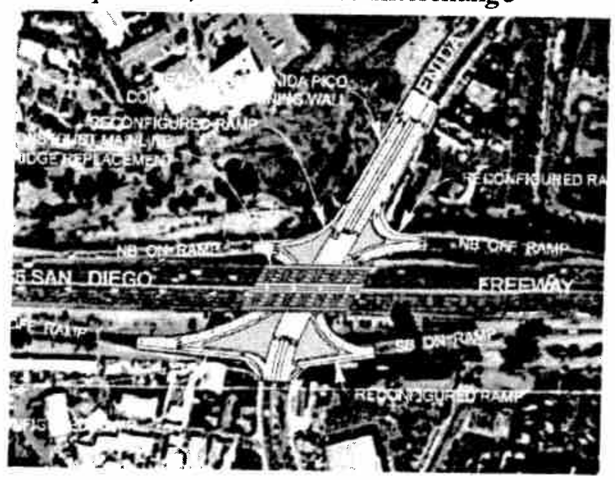
Again, the AIP-SEIR applies the Partial Cloverleaf interchange to this location, which results in massive impacts to both commercial property and a local school. Either a split diamond interchange or single point interchange will provide sufficient capacity for the design year traffic. Figure 11 shows the AIP-SEIR compared to the AIP-R.

Figure 11: Avenida Pico Interchange: AIP-SEIR and AIP-R

AIP-SEIR	AIP-R
	
The partial cloverleaf results in substantial takings of commercial properties, as well as an impact to school property from a proposed detention basin.	The single point diamond eliminates all property takings. The detention basins are relocated as shown, and as described in the Runoff Management Plan, and do not result in displacement of buildings.

Figure 12 at right shows an illustration of a single point diamond interchange for this location, from study conducted by the City of San Clemente[20], further showing the suitability of this design. This single point diamond interchange was found to perform very well in terms of traffic congestion relief, and did not require property acquisition. Several other options are currently under consideration by the City of San Clemente. The AIP-R can be adapted to be consistent with the locally preferred alternative at this location, once it is selected. The illustrations above and at right show that in fact, alternatives are available that will result in fewer displacements.

Figure 12: Single Point Diamond Interchange Concept at I-5/Avenida Pico Interchange

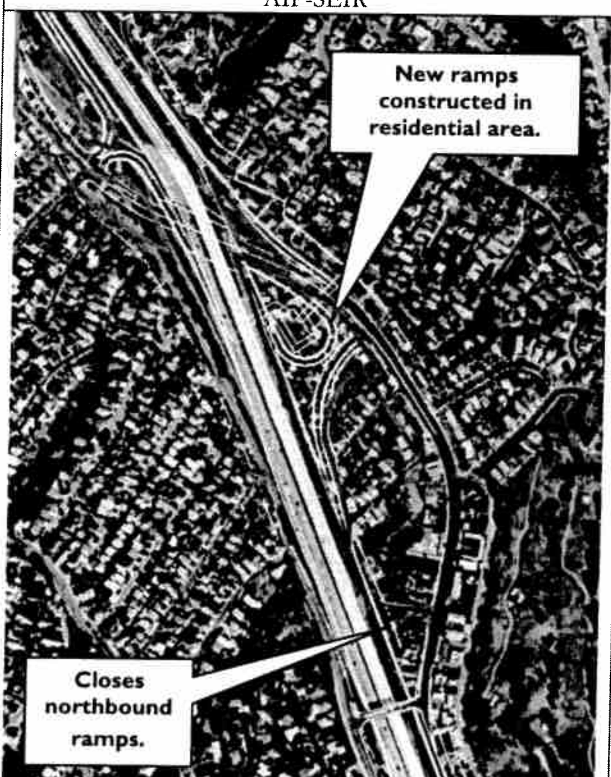
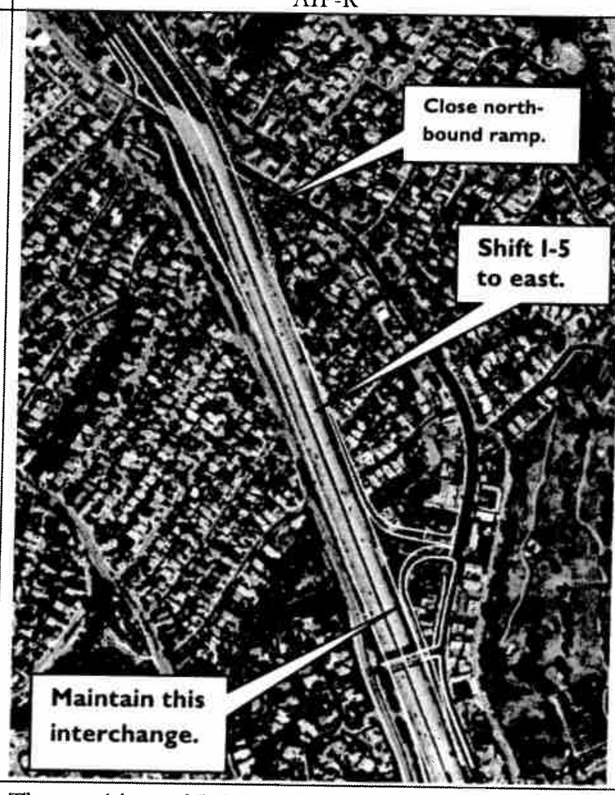


[20] *Avenida Pico at I-5 Improvements-Preliminary Alternatives Study*, City of San Clemente, Project no. 35801, Moffat and McNichol, February 2006.

El Camino Real Interchange

The AIP-SEIR proposed major reconstruction of this interchange, resulting in massive property impacts at this location. However, this interchange has relatively lower traffic volumes than other interchanges in the project area, and reconstruction as proposed in the SEIR is simply not necessary or warranted. While traffic volumes are not especially high in this location, there are several very closely spaced ramps that result in safety and operational challenges. The AIP-SEIR closes two existing northbound ramps, and constructs a new ramp system that would displace many homes, which is illustrated below on the left side of Figure 13. On the right is the design proposed for the AIP-R, which provides adequate traffic capacity for the projected future traffic volumes. The AIP-R plan includes closing one of the two very closely spaced northbound ramps with El Camino Real, which will improve safety for I-5 traffic. The volumes on the interchange ramps are relatively low, and the proposed ramp reconfiguration will easily provide sufficient peak hour capacity for the year 2025.

Figure 13: AIP-SEIR Proposed Reconstruction of El Camino Real/I-5 Interchange ~~in San~~ Clemente and AIP-R alternative

<table>
<tr><th>AIP-SEIR</th><th>AIP-R</th></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td>The AIP-SEIR proposed complete reconfiguration of this interchange, including a partial cloverleaf and detention basin for the northbound, and trumpet for the southbound. The SEIR proposed to close a northbound interchange with El Camino Real.</td><td>The southbound I-5 interchange remains in its existing configuration as a tight diamond. The northerly northbound ramp is closed, and the northbound slip ramps are improved. The centerline of I-5 is shifted slightly to the east. The detention basin has been combined with an enlarged EDB 1-B, as described in the Runoff Management Plan.</td></tr>
</table>

Arterial Improvements

In addition to the improvement along the I-5 corridor, the AIP-SEIR and AIP-R include improvements to several arterial corridors. Most of these can be accommodated within the publicly owned right-of-way, and therefore do not result in property impacts. The TCA report projected numerous property takings at several locations along the arterials, which are reviewed in the following sections.

Oso Parkway

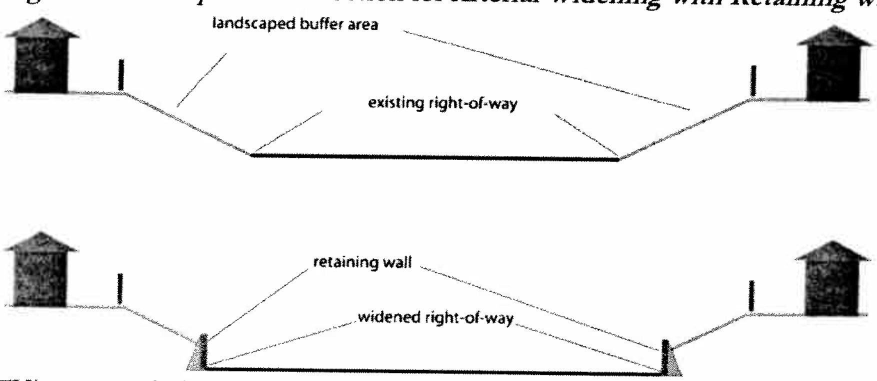
Oso Parkway is proposed to be widened from its current configuration of 6 lanes to an 8 lane smart street. The TCA's SEIR projected significant impacts to dozens of homes along this 1.25 mile segment. However, upon more careful consideration, it is apparent that the widening of Oso Parkway by two lanes could be achieved within the public right-of-way. Figure 14 below shows a segment of Oso Parkway with the TCA's projected takings marked. Property takings are estimated on both sides of the arterial, and for some distance away from the edge of construction, which is clearly unnecessary to add one lane in each direction to this road. The locations below were identified through the Mission Viejo online GIS database of parcel boundaries, matched by street addresses of the parcel.

Figure 14: AIP-SEIR Reported Takings along Oso Parkway

Figure 15 above also illustrates several major flaws with the analysis conducted by TCA to determine the number of displacements for the AIP alternative. First, there are obviously errors in which properties that were identified as displacements, with properties on Chandler Place and those on the wrong side of Edmonton Way. Beyond these clear errors, the takings are grossly overestimated. The existing arterial right-of way can accommodate the widening without requiring takings of residences. If takings were necessary, it would be responsible engineering practice to minimize the number of takings by assuming that they are required only on one side of the arterial, and not on both sides as proposed by TCA. Based on the existing available right-of-way, and proposed lane configuration, the AIP-R should not result in any displacements for this segment.

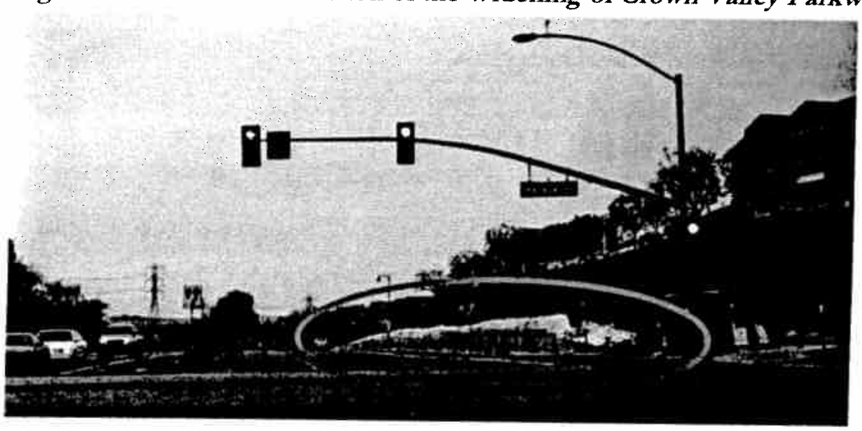
Figure 15:Landscaped Buffer along Oso Parkway east of Antonio Parkway

Figure 16: Example Cross Section for Arterial Widening with Retaining walls



THis exact technique is common to avoid the property impacts that might otherwise result from road widening. In fact, the photo below shows this technique in a similar setting on Crown Valley Parkway at Marguerite Ave.

Figure 17: Recent Construction of the Widening of Crown Valley Parkway



Antonio Parkway Intersections

The takings analysis in the AIP-SEIR assumed grade separations at two intersections along Antonio Parkway which resulted in significant property impacts. However, the TCA's documentation of traffic operations[21] shows that grade separation is not required at these locations, and that at-grade improvements provide comparable levels of service as in the toll road scenarios. Figure 18 and 19 shows the TCA proposals for these intersections, which include costly flyover ramps that the SEIR's traffic analysis shows is not necessary.

Figure 18: Antonio Parkway/Oso Parkway Intersection Design: AIP-SEIR

Figure 19: Crown Valley/Antonio Parkway Intersection Design: AIP-SEIR

Table 3 below compares the projected level of service at the above two intersections in four scenarios: the 2025 No Action, 2025 with the preferred toll highway alternative, 2025 with the AIP without grade separation, and 2025 AIP with grade separation.

Table 3: Peak Hour Level of Service (Scenario 3: Build Out Circulation with Proposed RMV Plan)

Antonio/Oso Parkway	AM Peak Hour LOS	PM Peak Hour LOS
2025 No Action	F	F
2025 A7C-FECV	E	E
2025 AIP-at grade mitigation	D	E
2025 AIP-w/ grade separation	C	E
Antonio/Crown Valley	AM Peak Hour LOS	PM Peak Hour LOS
2025 No Action	D	F
2025 A7C-FECV	D	E
2025 AIP-at grade mitigation	C	E
2025 AIP-w/ grade separation	B	C

* Tables F-7, F-34 and F-40, TCTR Appendix F

[21] TCTR Tables F-34 and F-40.

The table above shows that grade separation at these intersections is not required for mitigation. In fact, the at-grade mitigation alternative perform better than the toll road alternative. Grade separation at these intersections is unnecessary, resulting only in unwarranted and excessive costs and impacts.

Pico/La Pata Intersection

At grade mitigation for this intersection was also found to be sufficient in SEIR[22]. Despite this good level of service, the SEIR assumed grade separated plan for this intersection, which resulted in substantial takings of commercial properties. Table 4 summarizes the results for this intersection from the SEIR.

Table 4: Peak Hour Level of Service (Scenario 3: Build Out Circulation with Proposed RMV Plan)

La Pata/Pico	AM Peak Hour LOS	PM Peak Hour LOS
2025 No Action	E	F
2025 A7C-FECV	B	D
2025 AIP-at grade mitigation	C	D
2025 AIP-w/ grade separation	B	C

* Tables F-7, F-34 and F-40, TCTR Appendix F

Again, the traffic analysis in the SEIR shows that this intersection will operate with acceptable level of service in the AM peak hour, and level of service D, same as the toll road scenario, for the PM peak hour. Again, grade separation is not required at this intersection in the AIP scenario, but the SEIR nonetheless included the high number of property impacts for grade separation in their analysis of displacements. Figure 20 compares the AIP-SEIR plan to the AIP-R plan. The AIP-R relies on the at-grade mitigation improvements for this intersection described in the SEIR, and will provide adequate level of service.

Figure 20: Avenida Pico/La Pata Intersection Designs

DEIS/SEIR	AIP-R
	
Substantial takings result from a flyover ramp from Pico eastbound to La Pata northbound. However based on the SEIR analysis, this ramp is not necessary to provide adequate levels of service.	At-grade improvements result in only minor partial takings of property along the southbound approach of La Pata.

22 SOCTIIP SEIR, Traffic and Circulation Technical Report, Appendix F, Table F-40,. Page. F-157, December 1, 2003.

I-5 Cross Sections

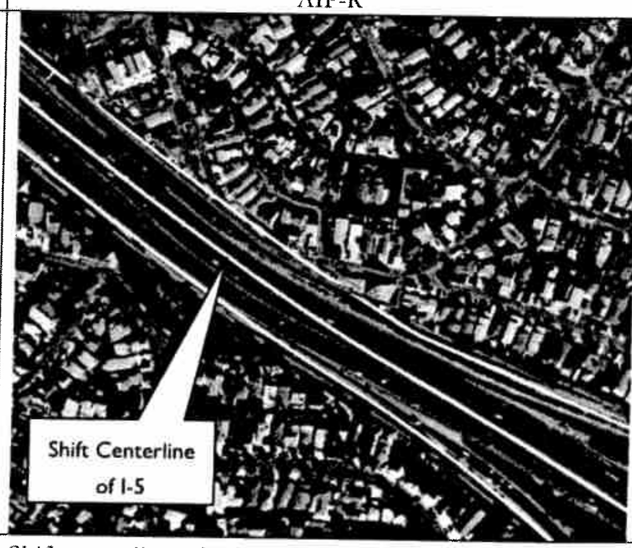
The overview maps also show locations where typical cross sections have been prepared to illustrate existing and proposed conditions, and how the design will affect roadside property. These have been specifically prepared for the locations where the TCA assumed significant displacements, to illustrate how the additional lanes will fit into the available right-of-way. While the areas have not been surveyed, these cross sections reflect typical conditions with sufficient detail to determine the likely extent of property impacts, and to illustrate the proposed future road conditions. Attached to this report are schematics of cross sections C, D, F, and I. Cross sections L and S are locations where the AIP-R will result in some displacements, and they are described below.

The AIP plans from the SEIR also included long segments of sound barriers, which further increased the TCA's estimated property impacts of the AIP-SEIR. However, no noise modeling was conducted to determine if the sound barriers are necessary per FHWA guidelines, or desirable, so it is premature to specifically locate sound barriers. For the AIP-R alternative, sound walls should be installed where deemed necessary after a comprehensive noise analysis and design. The AIP-R provides a buffer between the edge of the road and adjacent properties of at least 10 feet, which is ample for a sound wall barrier. Therefore, sound walls will not result in increased property impacts.

Cross Section L: Calle Portola, San Clemente

This cross section will have two HOV lanes in each direction added to the cross section, which will exceed the available right-of-way in some locations. Figure 21 below compares the AIP-TCA plan with that proposed in the AIP-R. In this segment, the TCA projects that 31 residential properties would be taken. In the AIP-R plan, this could be reduced to 14 by slightly shifting the centerline of I-5, which will help correct a small curve in its alignment. This results in fewer properties required, all from the north/east side of I-5.

Figure 21: Cross Section for Segment L: AIP –TCA and AIP-R

DEIS/SEIR	AIP-R
	
AIP-SEIR results in residential property takings on both sides of I-5.	Shift centerline of I-5 to smooth small curve, and take property only on one side of I-5.

Cross Section S: El Camino Real, San Clemente

In this cross section, at the southern-most part of the AIP-R alternative, I-5 is paralleled by El Camino Real in San Clemente. The AIP-SEIR included significant property takings in this area; however, the widening proposed in this location is one lane in each direction PLUS one HOV lane in each direction. This is in excess of what is described as the AIP alternative, which is described as the addition of only one HOV lane in each direction in this location The purported impacts are overestimated for this location in the SEIR due in part to this inconsistency, and in part due to lack of creativity in design. Figure 22 shows an excerpt from the AIP-SEIR for this section, and Figure 23 shows the AIP-R plan for this section.

Figure 22: AIP-SEIR Plan for I-5 at Cross Section S, El Camino Real, San Clemente

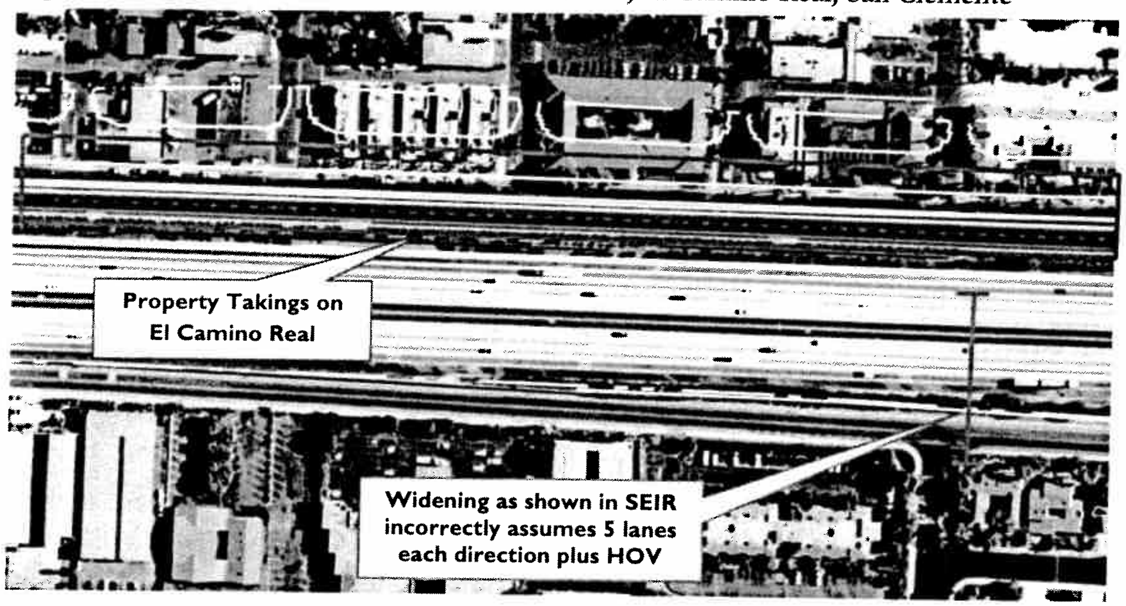
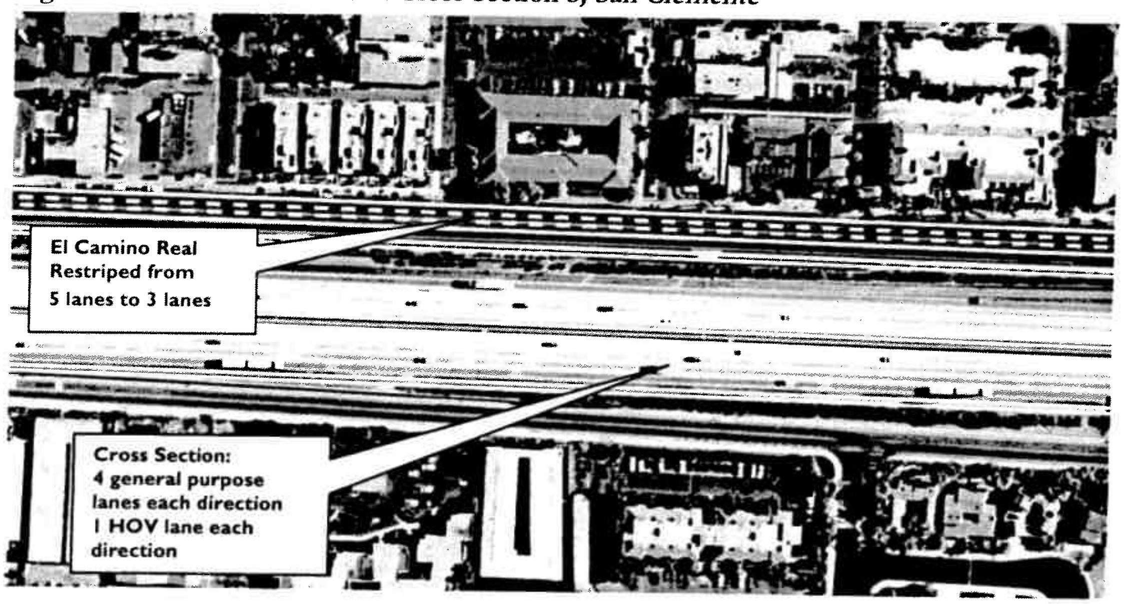


Figure 23: AIP-R Plan for I-5 at Cross Section S, San Clemente



This section of El Camino Real has low traffic volumes, ranging from 4,000 ADT to 7,000 ADT[23], which reflect this portion of the road is essentially a dead end. These volumes are very easily accommodated by a narrower cross section, which is proposed to be three lanes (one lane each direction plus left turn lane). In fact, the volumes are comparable to those on Ave Presidente, located on the other side of I-5, which is only two lanes, and is not considered congested. Due to the nearby beaches and adjacent shops, there is significant pedestrian and bicycle traffic. The environment for pedestrians and bicyclists on this portion of El Camino Real would be improved by the conversion to a three lane cross section, as it will result in slower but steady traffic speeds, narrower crossing distances for pedestrians, and increased safety.

Figure 24: El Camino Real at Cross Section S, San Clemente

Runoff Management Plan

The AIP-SEIR plan included large detention basins that are required to improve water quality in this sensitive area. As with the highway design features of the AIP-SEIR plan, other alternatives with less impact are available. Again, there are many opportunities to substantially reduce property takings by relatively minor refinements to the runoff management plan. Appendix 2 contains a detailed description of the plan, and of the changes to each proposed detention basin in the AIP-R..

A conceptual level Runoff Management Plan has been developed for the AIP-R alternative that reduces impact to developed areas by locating detention basins in undeveloped areas. The methods and criteria used to develop the AIP-R Runoff Management Plan were similar to those used to develop the runoff management plan proposed for the SOCTIIP AIP to aid in comparison between the SOCTIIP AIP alternative and the proposed AIP-R. The proposed AIP-R Runoff Management Plan would provide similar or improved water quality treatment as compared to the SOCTIIP AIP alternative by proposing larger detention facilities, additional vegetated swales, and pretreatment. Topography was considered in the placement and design of the run-off detention facilities. Moreover, a 10-meter buffer around proposed basins is provided to allow for modifications to address slope or other contingencies that might arise at the final engineering stage. If the buffer were not sufficient, a retaining wall could be used, for example. In addition, the proposed AIP-R Runoff Management Plan is extended south including an additional detention facility that provides treatment of runoff discharged into San Mateo Creek that would not be treated under the SOCTIIP AIP alternative.

---

[23] Orange County Transportation Authority, Traffic Volume Map, 2005, http://www.octa.net/pdf/2005.pdf

Further Enhancements to the AIP-R Alternative

The following sections describe in conceptual terms several possible further improvements that would enhance the mobility improvements provided by the AIP-R alternative. These are not included at this time in the cost estimates, but are described in order to show the opportunities that exist to further enhance the mobility in the I-5 and arterial corridors.

Enhanced Transit Component for the Arterials Improvement Plan (AIP)

To be a more complete transportation alternative/plan, the AIP should incorporate enhanced transit service, appropriate to the land use and urban geography of the south Orange County area. An alternative that replaced the south FTC corridor with a light rail transit system was correctly deemed infeasible and eliminated from further study due to the lower density nature of the south county area and the lack of connection to destinations[24]. There is quite a range of transit services available between standard local fixed-route bus service and light rail transit, however, many of which are offered by OCTA in the northern portions of the county. A more realistic plan for providing enhanced transit service as a complement to the improved arterials plan in the south county area should be given consideration.

With respect to transit, the SOCTIIP Final SEIR (December 2005) states the traffic model assumptions as follows: "..*The OCTAM 3.1 traffic model, which is the basis for the traffic forecasting for the SOCTIIP, assumes the OCTA transit services that were in place in September 2000 for the base year conditions. The 2025 transit conditions in the OCTAM 3.1 model, used in SOCTIIP, assume that there will be improvements to select route headways, no new local routes, and an increase of approximately 50 percent in local bus service. Since there are no plans or funding committed to implementing a light rail system in Orange County at this time, none are assumed in the OCTAM 3.1 model.....*"

Without any specification as to the 'select' route headways that were improved, it is difficult to evaluate whether the transit services assumed for the 2025 horizon keep pace with the rate of new development in the south county area for this same time period. The statement asserts that future transit service will largely consist of increased headways on some existing lines and increases in local bus services. The south county area is primarily served by local bus and the Metrolink commuter rail service.

The following describes a more realistic enhancement of transit service more appropriate to the projected growth in the area and as a component of a more balanced AIP plan that has the potential attract choice riders (i.e., riders that would otherwise drive) and further improve transportation service in the south county.

Transit Services in Suburban Communities

Providing transit services in suburban areas is a more difficult task due to dispersed development patterns and lower overall development densities. However, with expanding congestion, increasing fuel prices and the 'greying' of the population (i.e., a growing proportion of seniors), improvements and innovations for transit service in suburban areas are evolving[25]. There is a diversity of transit service options provided within Orange County, but options beyond local fixed-route bus services are focused in the northern and central portions of the county. Overall, this area is more densely developed, has lower median incomes, lower automobile ownership rates and a more consistent grid pattern of roadways that lends itself to

---

[24] Pushkarev and Zupan, *Public Transportation and Land Use Policy*, Indiana University Press, 1977.

[25] Transportation Research Board, TCRP Report 116, Guidebook for Evaluating, Selecting, and Implementing Suburban Transit Services, 2006.

transit service and an efficient bus routing pattern[26]. With future population growth concentrated in the south county area, and employment growth in the central portion of the county, however, provision of enhanced transit service to this area is warranted.

Typical trip purposes that are served by suburban transit services include long-distance commuting, connections to the regional transit network, and community-to-community connections[27]. In Orange County, links to primary employment centers in the central and north county areas, links to the Metrolink commuter rail stations, the Irvine Transportation Center, and core community centers should form the bones of the transit network in the south county area. The following provides an overview of transportation services typically established in suburban areas:

Fixed Route—traditional transit service that follows a predetermined alignment and schedule. There are many variations on this service including peak-hour service, all-day service, as well as the following:

- Trunk
- Express
- Limited Service
- Circulators, and
- Shuttles and Feeders

Deviated Fixed Route Service—transit vehicles operate within a given service area, but has flexibility in their route between arriving at specific stops at specific time points. Examples of these flexible routes are:

- Circulators, and
- Shuttles

Demand Responsive Service—also called 'dial a ride' service that provides door-to-door service from a call in request.

Subscription Service—transit service to specific individuals that pay a subscription fee.

- Subscription commute buses and
- Vanpools

Innovations in Transit Services

Innovations in technology is an evolving area that is improving the dissemination of information related to schedule and operations to customers and service personnel and hence expedite transit service. Innovations include the following:

- ***Real-time information***, that informs customers and service providers on arrival times, operations related announcements, and so forth.
- ***Transit preferential treatment***, capital improvements such as queue jump lanes, traffic signal priority, dedicated transit lanes.
- ***Vehicle modifications***, such as low floor vehicles to expedite passenger boarding and decrease travel times; and
- ***Fare technologies***, such as smart cards, prepaid passes that expedite passenger boarding and decrease travel times.

Enhanced Transit Component of the AIP Alternative

Considering the physical and socio-economic characteristics of the south county, specifically the more moderate development densities, lower-levels of street connectivity, and higher income levels and car ownership rates, the following enhanced transit services provide an alternative to the light rail option that is

[26] Orange County Transportation Authority (OCTA), *New Directions, Charting the Course for Orange County's Future Transportation System*, 2006

[27] TRB, 2006

more realistic. All of these options could be implemented at significantly lower costs than light-rail and using infrastructure that is currently in place. In each case, the enhanced transit alternative utilizes the HOV lanes on Interstate 5 as a core element of the system.

Express Bus

Express bus services are characterized by limited numbers of stops along a prescribed route in order to minimize the travel time along the route, in this setting serving community to community and long distance commuting. Express busses are particularly advantageous in areas with HOV networks and with queue jump lanes and signal priority capabilities in the urban street system. Express bus services can be accessed from park and ride lots, shuttle circulators, or transit stops. The OCTA currently provides express bus service (OC Express) from Pomona, Chino and Riverside to Santa Ana, Irvine, and the south coast utilizing HOV lanes along Route 91. With the planned expansion of HOV lanes on I-5, express bus services from south county communities to Irvine and the north county area would be greatly enhanced.

Bus Rapid Transit

Bus Rapid Transit (BRT) is another option. BRT has many of the advantages of rail transit, such as wider station spacing, expedited fare collection and boarding, 'smart technologies' such as intersection priority (queue jump capabilities) and real time schedule information that allow the faster travel times that attract choice riders, without the disadvantages and considerable capital costs associated with fixed guideway systems (such as LRT). OCTA's 2006 Long Range Transportation Plan identified several BRT corridors in the northern portion of the county, but does not identify a corridor in the south county area at this time. BRT could be implemented in addition to express bus services, or as a later phase of express bus service, as transportation conditions warrant.

Subscription Bus

Yet another option well-suited to the suburban environment is the subscription bus. Often offered by large institutions or employers that collect many riders and bring them to one location, such as vanpools or airport shuttles, subscription buses would similarly benefit from the regional HOV network to expedite the commute. Subscription services are often private or public-private partnerships that collect passengers at predetermined times and locations. With growing congestion in California's metropolitan areas, larger employers offer such commute services as a 'perk' to their workers[28].

Infrastructure Requirements

While all of these services can be implemented using the existing network of streets and highways, improvements to the arterial road system that would expedite transit services would benefit all of the bus transit options described above and improve transit ridership by providing a time advantage that the local fixed-route bus service cannot provide. At the core of the system is the HOV network, but improvements to local and regional arterials are also desirable, as follows:

New Roadway Construction: New arterials, such as Antonio Parkway, should incorporate specific design improvements and made to be 'transit-ready' as a part of new construction. A dedicated transit lane or mixed flow lanes with queue-jump capabilities, attractive station areas with sidewalk ticket vending machines, real-time vehicle tracking, signal manipulation, and attractive streetscape

[28] Helft, Michael, "Google's Buses Help its Workers Beat the Rush," *New York Times*, March 10, 2007

amenities and convenient pedestrian access (crossings and walkways into surrounding areas) should be integrated into the new roadway construction.

Retrofit Existing Arterials: Existing arterials connecting to significant destinations can be retrofitted with attractive stations, signal priority and queue jump facilities, bus bulbs, real time bus information, and ticket vending machines as permitted by existing rights of way.

Land Use Considerations

Any discussion of transit is not complete without discussion of the service area characteristics in terms of land use and community design. Land use characteristics of most concern for transit service are often described as the 'four D's': density, diversity, design and deterrents to driving. Density refers to overall numbers of housing units or people (employees or residents) per unit of geographic area. Diversity in this case refers to the overall mix of uses and activities in an area. Design or development pattern refers to a number of factors including the connectivity of the road network, the quality and scale of the pedestrian environment (transit trips generally begin and end as pedestrian trips). The most effective deterrent to driving is costly and limited parking.

The SOCTIIP SEIR cites that existing and anticipated employment densities in south Orange County would not be adequate to sustain LRT. The lower capacity of express bus, BRT, and subscription services can operate within the moderate density geography of the south county area. While development density in the south communities is cited as 'low' in the SOCTIIP SEIR, presumably on a gross basis, on a net basis, development patterns are quite nodal, and numerous higher density 'nodes' of development (apartment and townhouses) are set within a larger single-family community. Communities also have a mix of land uses, including housing, shops, offices, and schools within its boundaries. The higher density nodes and mix of uses are well adapted to transit service.

Another advantage of transit options described above is the ability for transit services to be located within existing arterial roadways where development is established, rather than relegated to the remote alignment of the proposed toll road (which was where the LRT system was hypothesized to be developed in the All Transit Alternative). One of the primary problems with the LRT alternative was the lack of connection to destinations, more specifically it ran from nowhere to nowhere. Unlike a fixed guideway LRT system, Express Bus, BRT, subscription buses, circulators can connect to existing destinations with relative ease. This advantage makes Express Bus or BRT a much more feasible transit option.

Existing development patterns typical of the master planned communities of the south county tend to reinforce automobile usage, through the design of the street networks, the orientation of development away from transportation corridors, circuitous and/or inconvenient and unattractive pedestrian routes between housing, retail and office complexes, as well as other factors. The county should identify transit corridors in new development areas (i.e., Rancho Mission Viejo) and incorporate Transit Oriented Development principles to remove barriers to transit and pedestrian movement. All new development should emphasize the pedestrian rather than an orientation exclusively to automobiles. To the extent feasible, improvements that facilitate pedestrian and transit movement in existing developed areas should be considered on a case-by-case basis.

RESULTS

Property Impacts of AIP-R Alternative

Based on the conceptual design provided in the attached sheets, interchange designs, and cross sections, the property impacts have been estimated and are summarized in Table 5. Overall, the vast majority of the improvements of the AIP-R alternative can be completed within the current I-5 right-of-way. To be consistent with the SEIR analysis, the average cost for each commercial and residential properties was calculated, and applied to estimated number of displacements for the AIP-R. In the SEIR, the average cost of a residential acquisition was $650,000, and the average cost of a commercial acquisition was $1,375,000.

Table 5: Potential Property Takings for the AIP-R Alternative by Community

	Residential Units	Estimated Acquisition Cost	Commercial/Industrial Tenants	Estimated Acquisition Cost
Dana Point	16	$ 10,400,000	0	-
Laguna Hills	0	-	3	$ 4,125,000
Laguna Niguel	0	-	13	$ 17,875,000
Mission Viejo	1	$ 650,000	0	-
San Clemente	15	$ 9,750,000	16	$ 22,000,000
San Juan Capistrano	1	$ 650,000	3	$ 4,125,000
Total	33	$ 21,450,000	35	$ 48,125,000
Grand Total	68	$ 69,575,000		

* This table reflects revisions to account for discrepancies between the AIP-R lane configuration from the report, *An Alternative to the Proposed Foothill South Toll Road-The Refined AIP Alternative*, September 2007.

Table 6 compares to the costs of acquiring property with displacements for the AIP alternative as reported in the AIP-SEIR with the AIP-R. The following table only includes properties with displaced structures, which is consistent with the estimates in the SEIR.

Table 6: Comparison of Displacements in AIP-R with AIP-SEIR

Type of Property	AIP- SEIR Displacements	AIP-R Displacements	AIP-SEIR Acquisition Cost	AIP-R Acquisition Cost	Cost for AIP-R as percent of AIP- SEIR
Residential	898	33	$ 583,700,000	$ 21,450,000	3.7%
Commercial	339	35	$ 466,125,000	$ 48,125,000	10.3%
Total	1,237	68	$ 1,049,825,000	$ 69,575,000	6.6%

At this planning level, the AIP-R alternative is estimated to result in the displacement of 33 residential properties and 35 commercial tenants (in 22 buildings), with an acquisition cost of approximately $70 million -- only 6%, and nearly $1 billion less than, the AIP acquisition cost estimate provided in the SEIR. The design concepts presented in this report require full engineering and design studies, and the final number of impacts could alter through this process, but it appears that it will be at least an order of magnitude less than TCA's estimates.

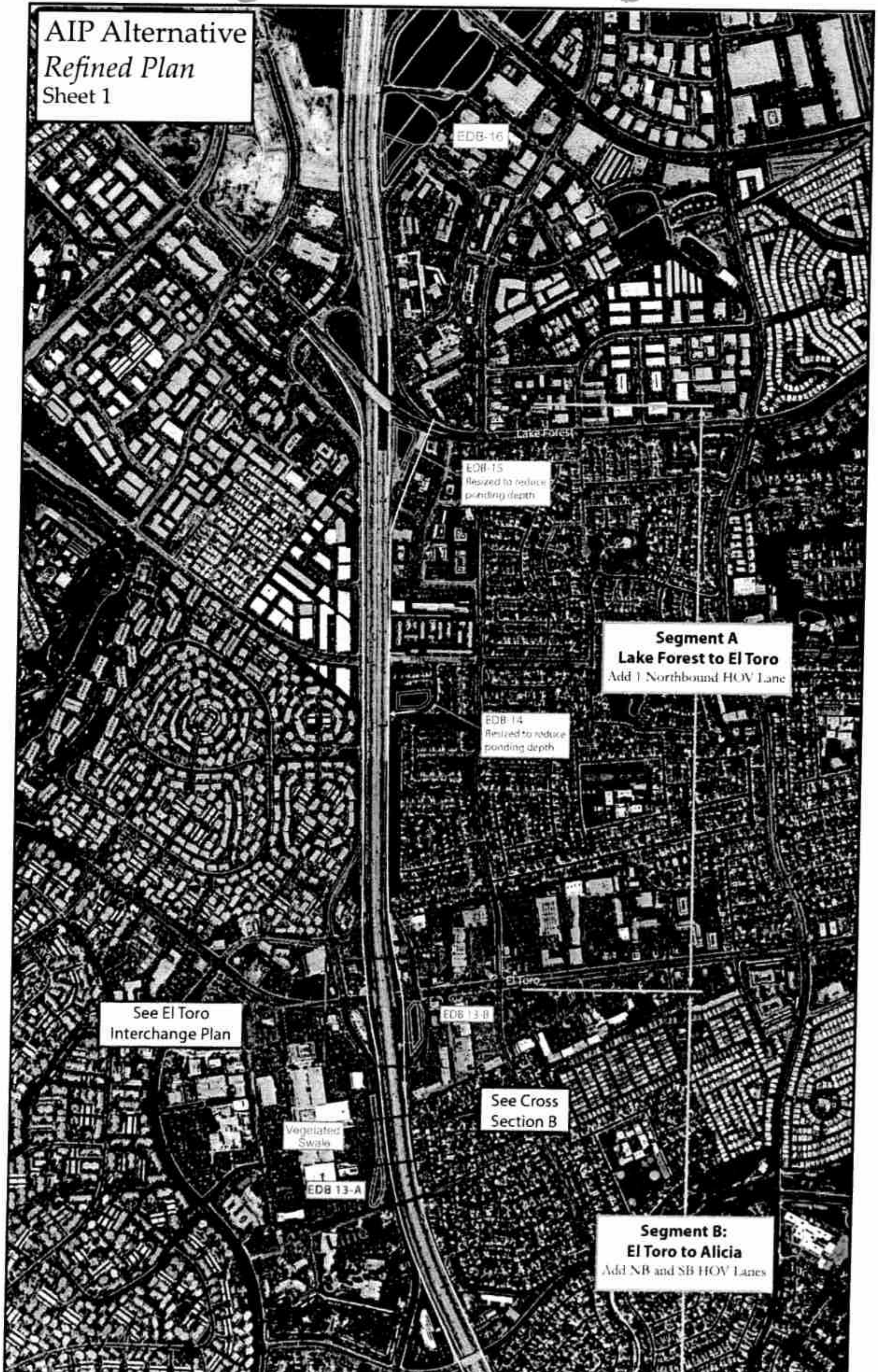
CONCLUSIONS

- At the planning design level of review, the AIP-R is a practicable, prudent and feasible alternative to the proposed Foothill South Toll Road that warrants further development and analysis.
- The AIP-Refined (AIP-R) alternative results in limited displacement when carefully designed to avoid private property, consistent with good engineering practice for designing transportation infrastructure in urbanized areas. This negates the primary reason for the rejection of the AIP alternative in the SEIR, impacts to private property.
- Based on SEIR data, the AIP-R alternative will have similar results the toll road in relieving I-5 congestion, regional travel time savings and other typical traffic performance measures.
- The design described in this report significantly reduces (about 95% based on preliminary estimates) the displacements identified in the SEIR without sacrificing performance.

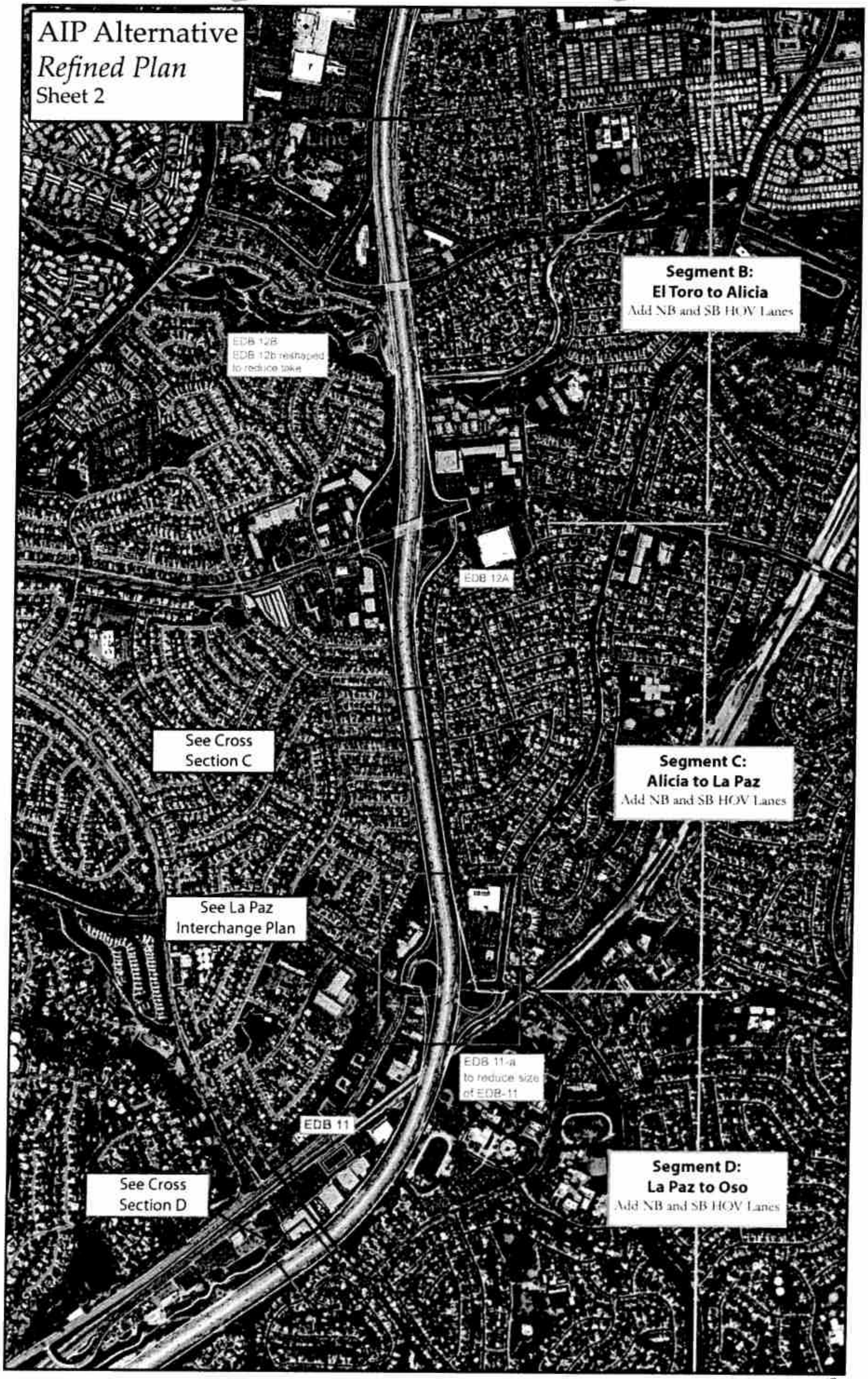
Attachments

- Project Area Maps
- Cross Sections
- Interchange Area Concepts
- List of Preparers

smart mobility

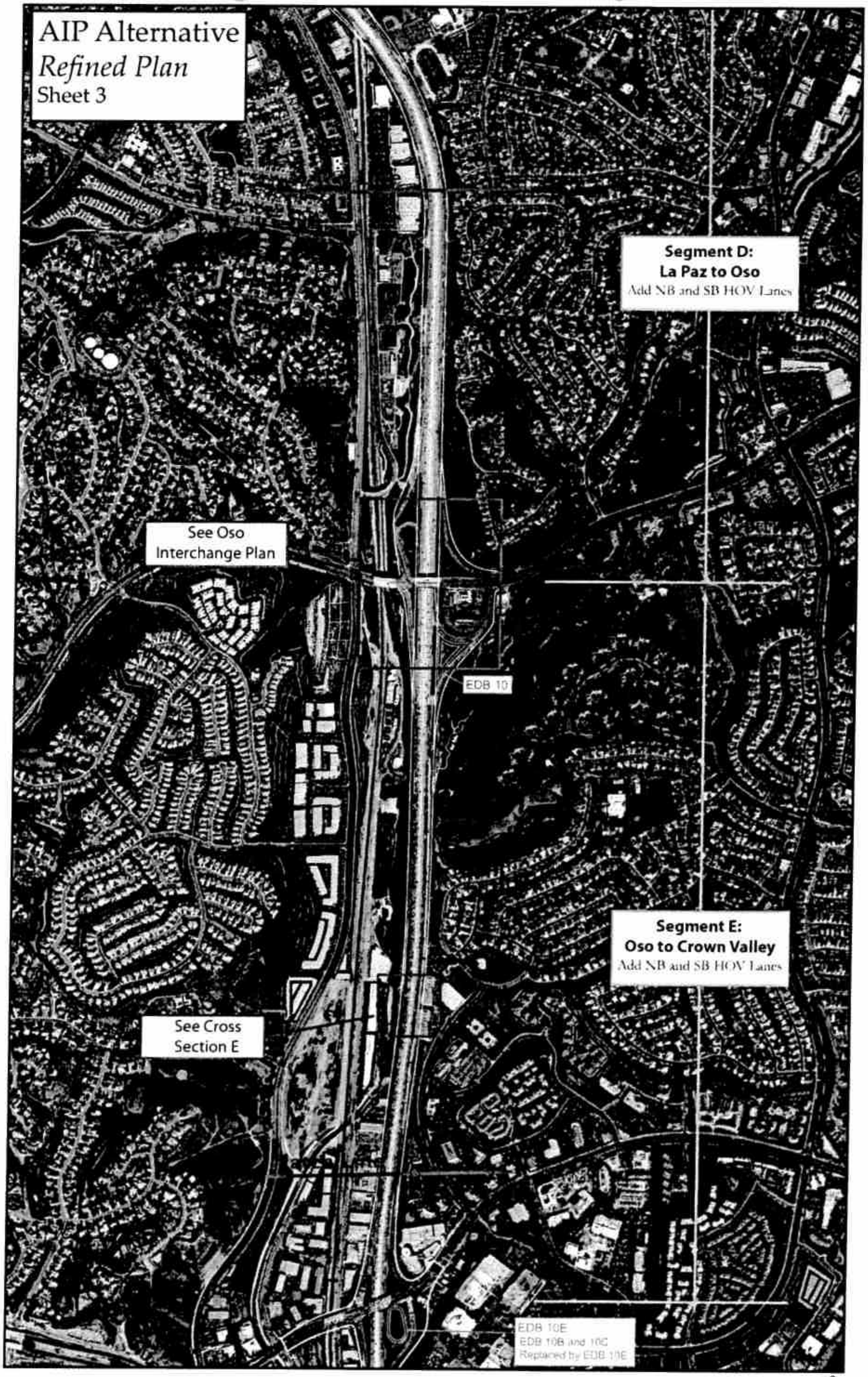

AIP Alternative
Refined Plan
Sheet 1
EDB-16
Lake Forest
EDB-15
Resized to reduce ponding depth
Segment A
Lake Forest to El Toro
Add 1 Northbound HOV Lane
EDB-14
Resized to reduce ponding depth
El Toro
See El Toro Interchange Plan
EDB 13-B
See Cross Section B
Vegetated Swale
EDB 13-A
Segment B:
El Toro to Alicia
Add NB and SB HOV Lanes

2,500 feet



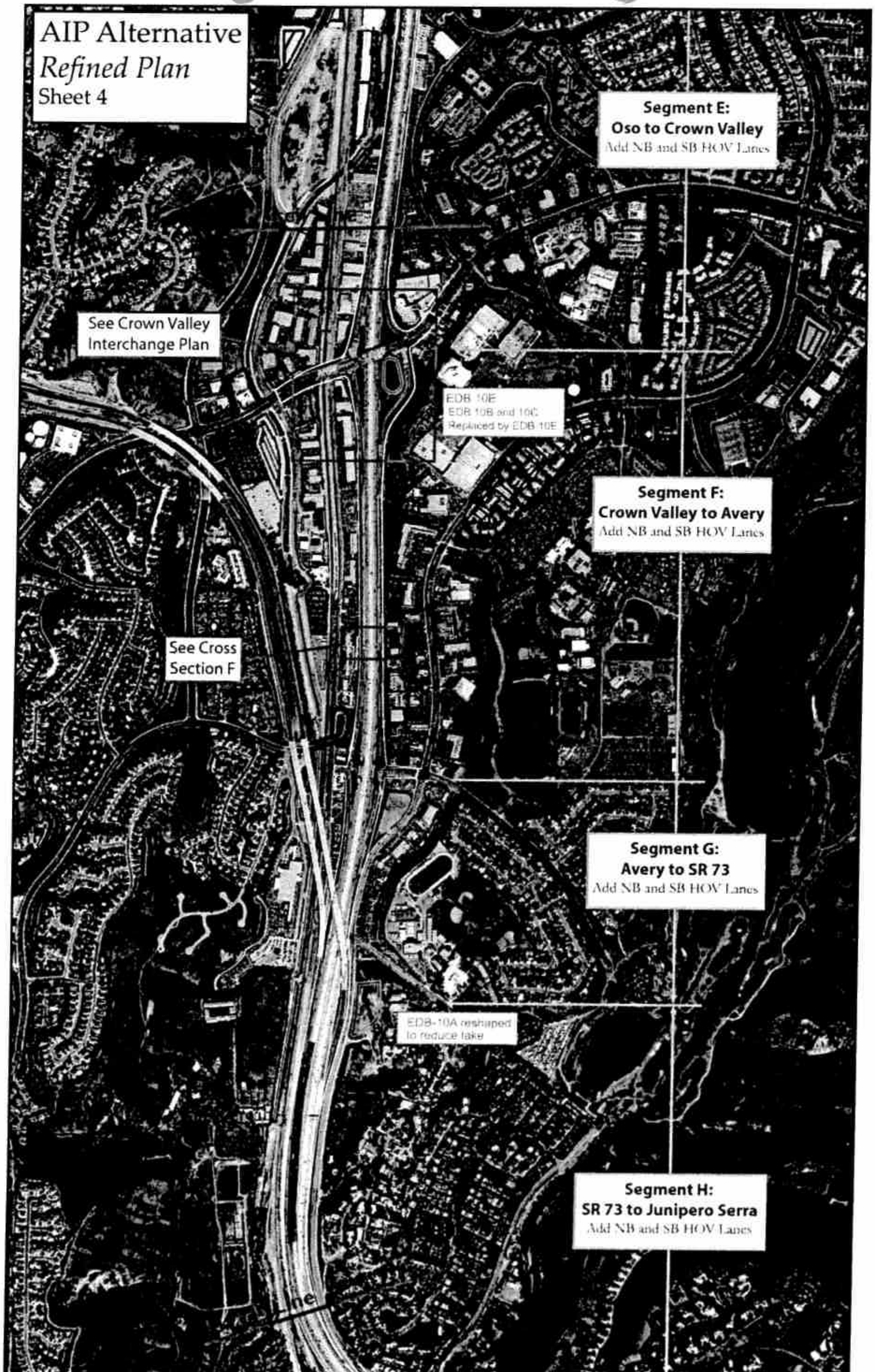
AIP Alternative
Refined Plan
Sheet 2
Segment B:
El Toro to Alicia
Add NB and SB HOV Lanes
EDB 12B
EDB 12b reshaped to reduce take
EDB 12A
See Cross Section C
Segment C:
Alicia to La Paz
Add NB and SB HOV Lanes
See La Paz Interchange Plan
EDB 11-a to reduce size of EDB-11
EDB 11
See Cross Section D
Segment D:
La Paz to Oso
Add NB and SB HOV Lanes

2,500 feet



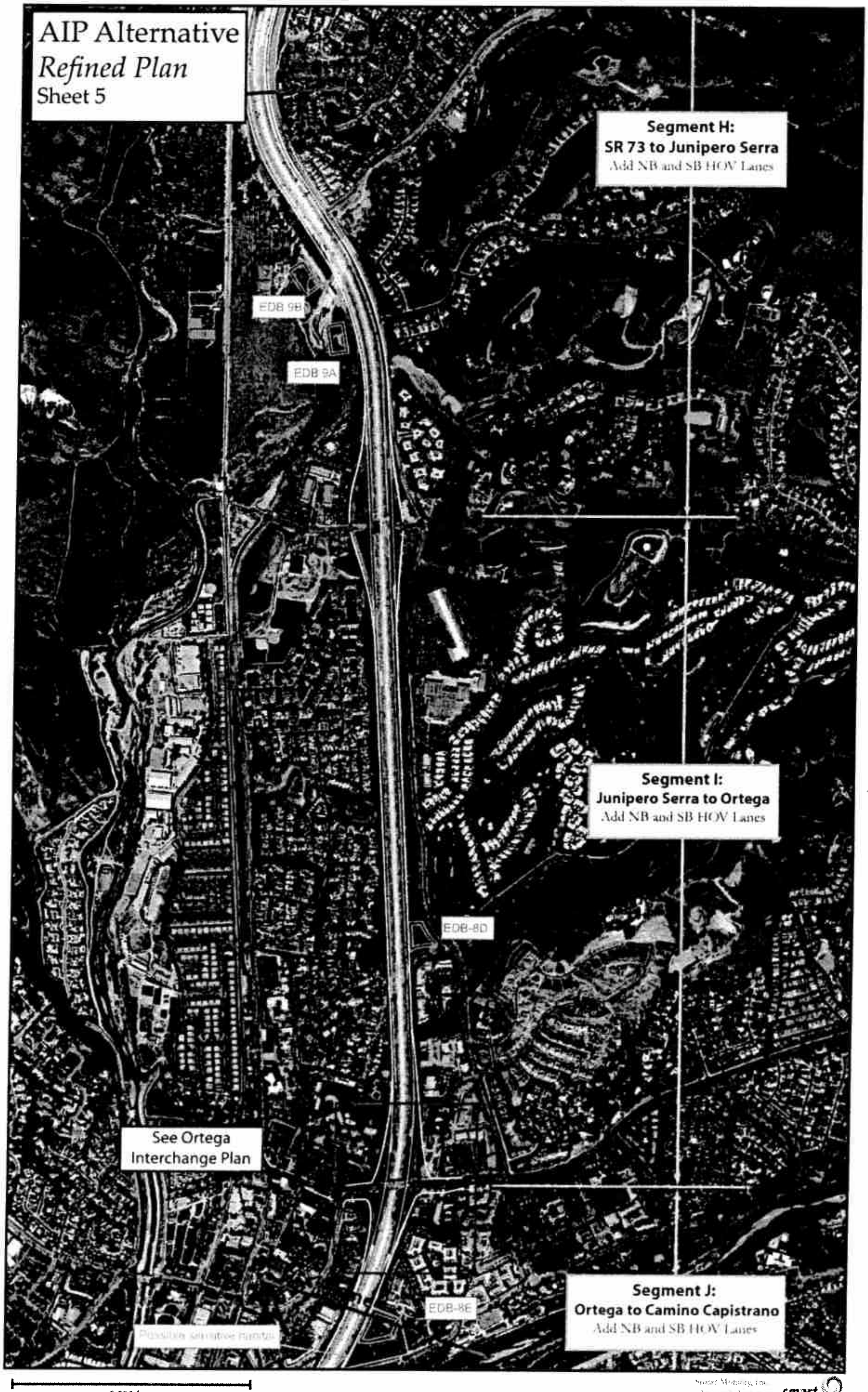
2,500 feet

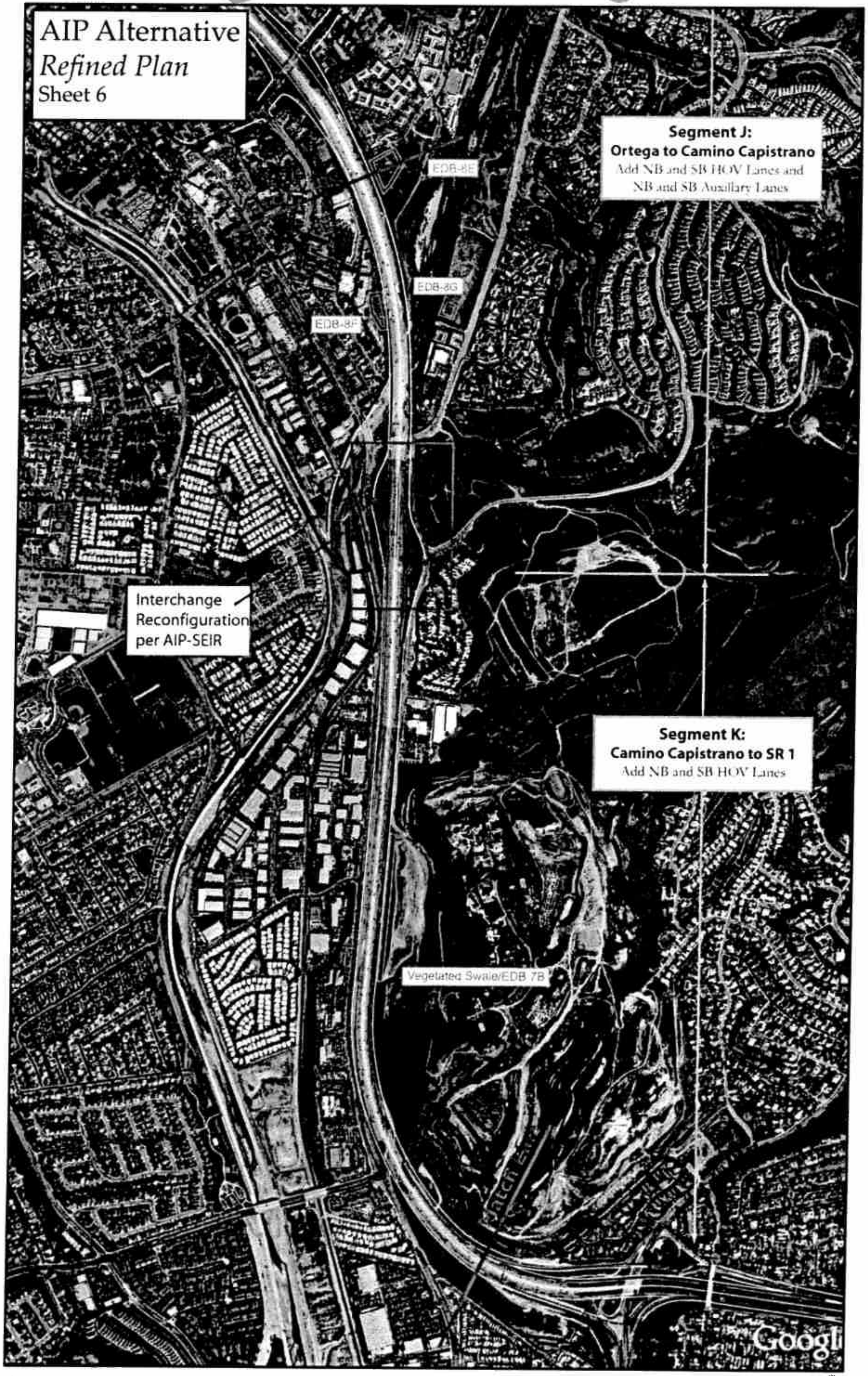
Smart Mobility, Inc.
Norwich, Vermont



2,500 feet

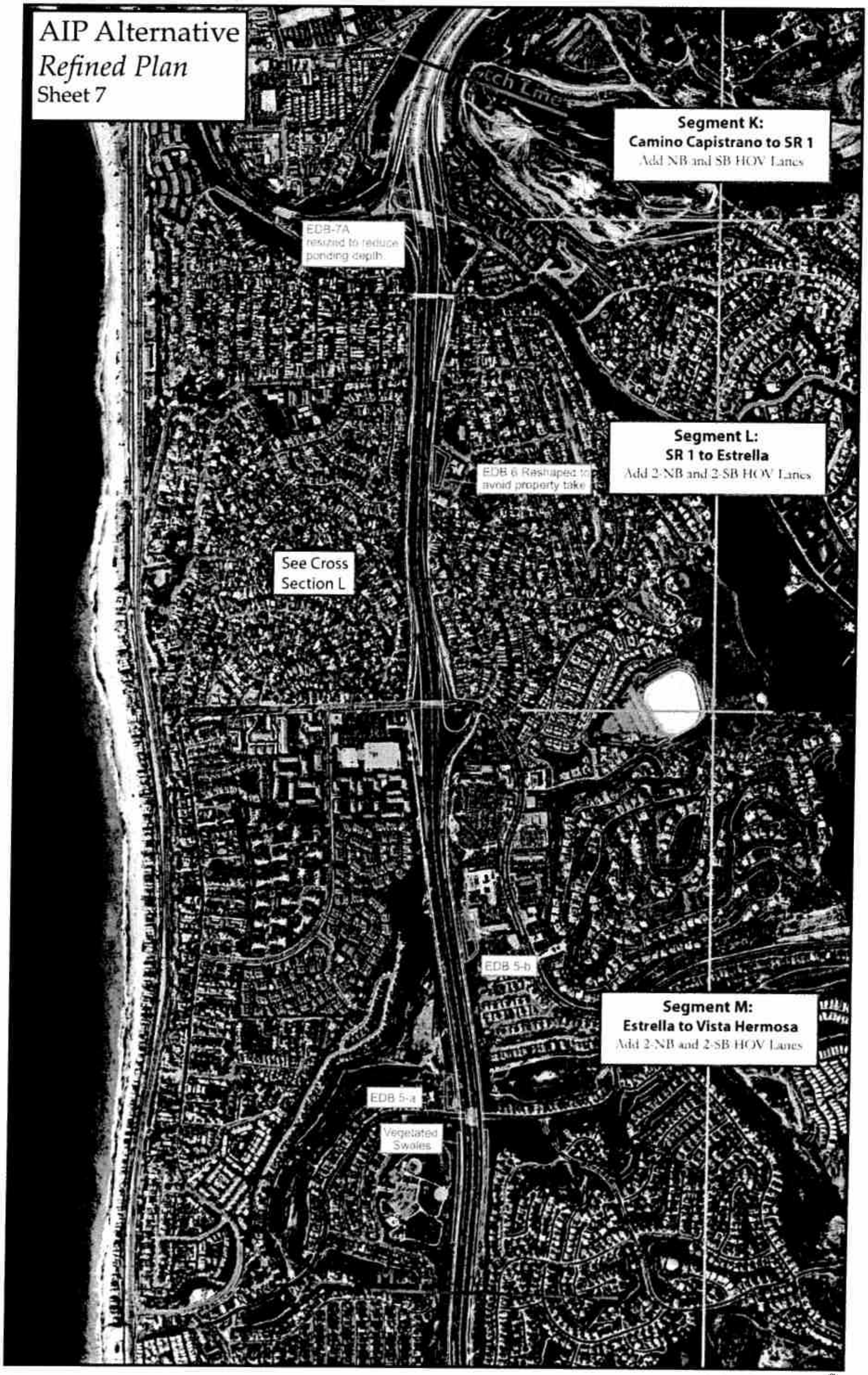
smart mobility


AIP Alternative
Refined Plan
Sheet 5
Segment H:
SR 73 to Junipero Serra
Add NB and SB HOV Lanes
EDB 9B
EDB 9A
Segment I:
Junipero Serra to Ortega
Add NB and SB HOV Lanes
EDB-8D
See Ortega
Interchange Plan
Segment J:
Ortega to Camino Capistrano
Add NB and SB HOV Lanes
EDB-8E
2,500 feet



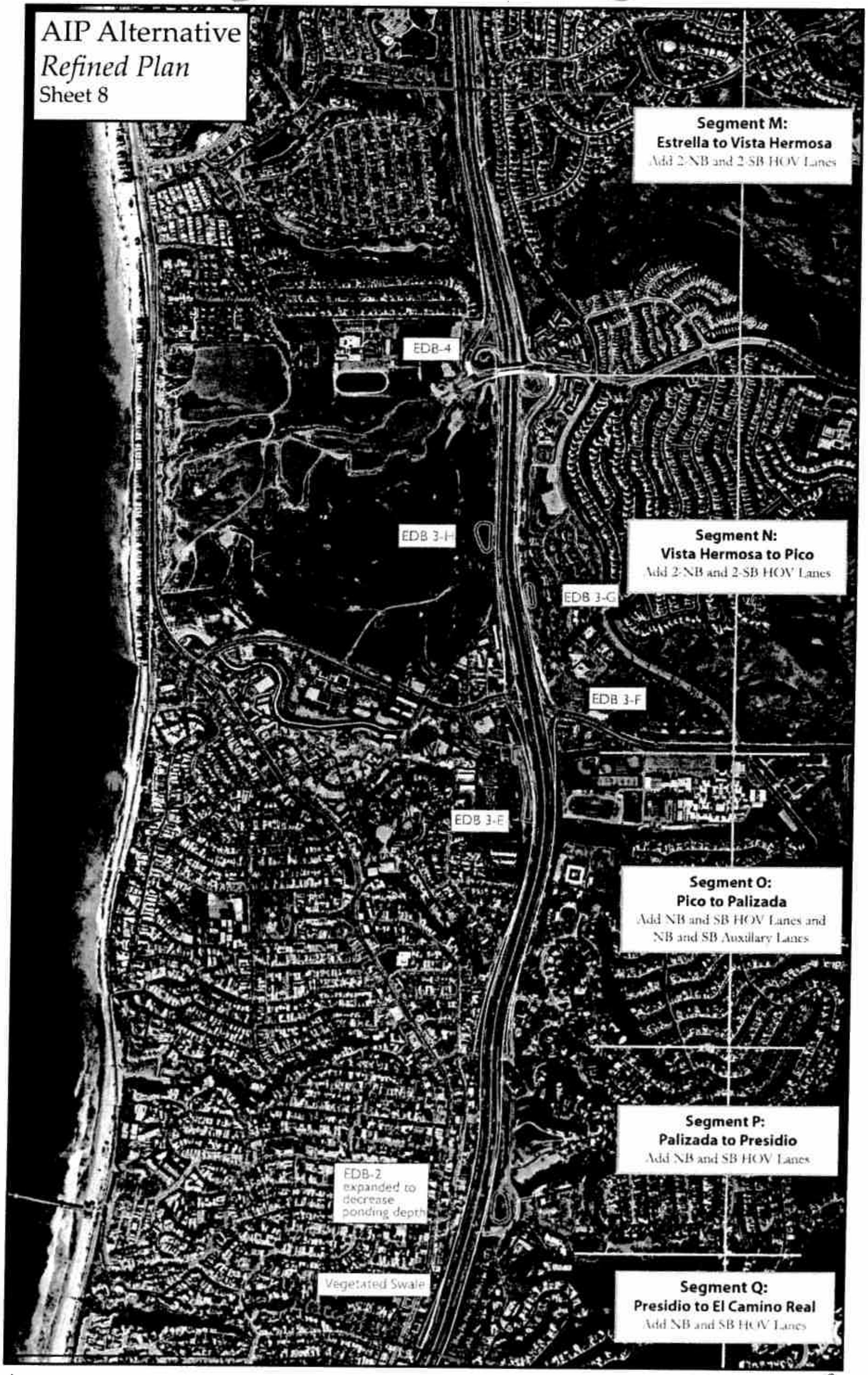
2,500 feet

Smart Mobility, Inc.
Norwich, Vermont
www.smartmobility.com
smart mobility



AIP Alternative
Refined Plan
Sheet 7
Segment K:
Camino Capistrano to SR 1
Add NB and SB HOV Lanes
EDB-7A
resized to reduce
ponding depth
Segment L:
SR 1 to Estrella
Add 2-NB and 2-SB HOV Lanes
EDB 6 Reshaped to
avoid property take
See Cross
Section L
EDB 5-b
Segment M:
Estrella to Vista Hermosa
Add 2-NB and 2-SB HOV Lanes
EDB 5-a
Vegetated
Swales

2,500 feet


AIP Alternative
Refined Plan
Sheet 8
Segment M:
Estrella to Vista Hermosa
Add 2-NB and 2-SB HOV Lanes
EDB-4
EDB 3-H
Segment N:
Vista Hermosa to Pico
Add 2-NB and 2-SB HOV Lanes
EDB 3-G
EDB 3-F
EDB 3-E
Segment O:
Pico to Palizada
Add NB and SB HOV Lanes and
NB and SB Auxiliary Lanes
Segment P:
Palizada to Presidio
Add NB and SB HOV Lanes
EDB-2
expanded to
decrease
ponding depth
Vegetated Swale
Segment Q:
Presidio to El Camino Real
Add NB and SB HOV Lanes

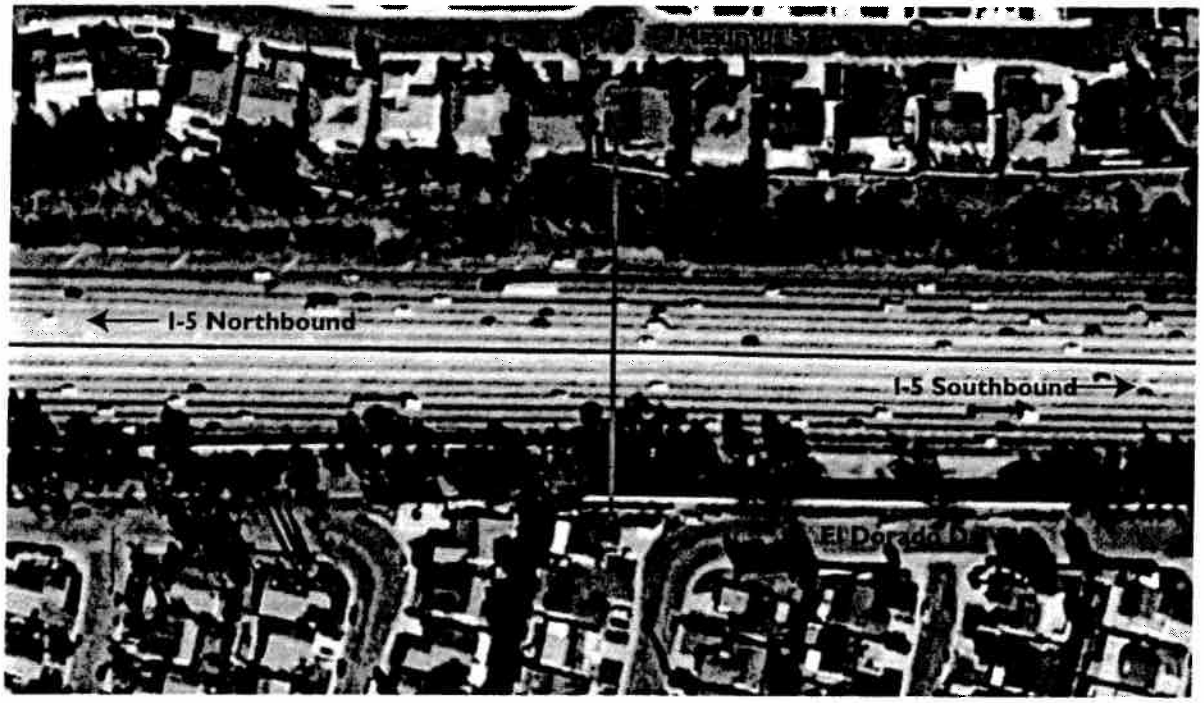
2,500 feet

2,500 feet

Smart Mobility, Inc.
Norwich, Vermont
www.smartmobility.com
smart mobility

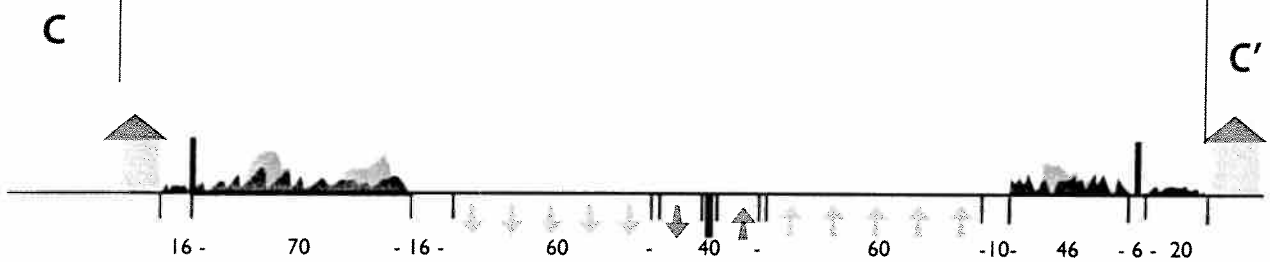
Cross Section C

Laguna Hills

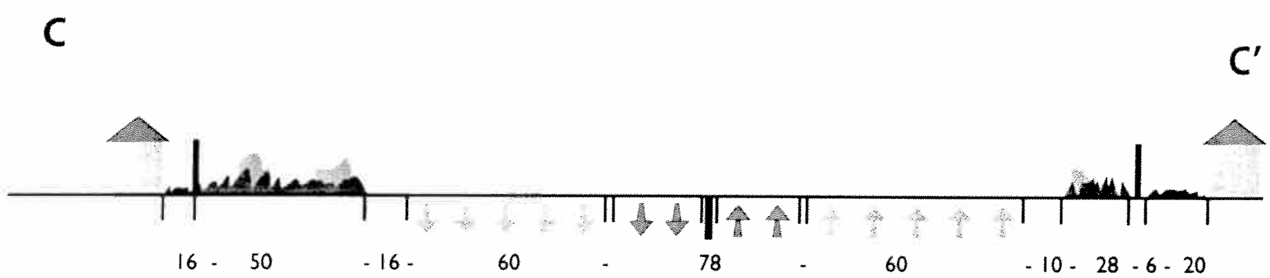


344 feet

Existing Cross Section

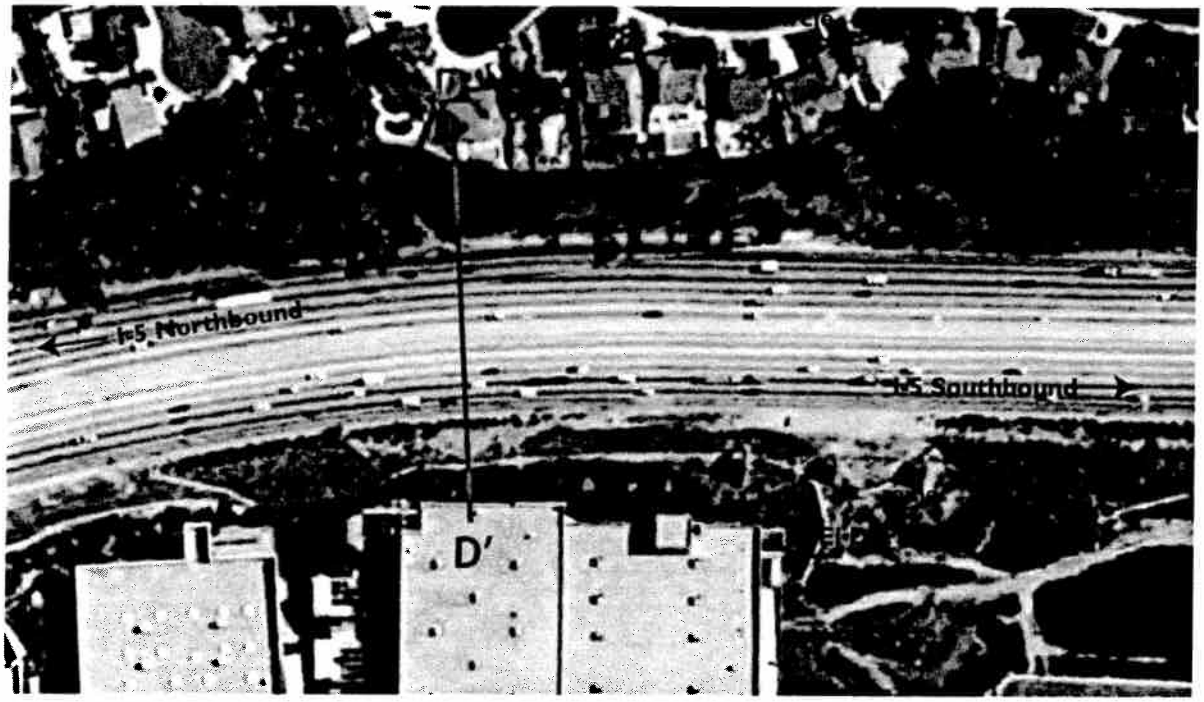


Proposed AIP Cross Section

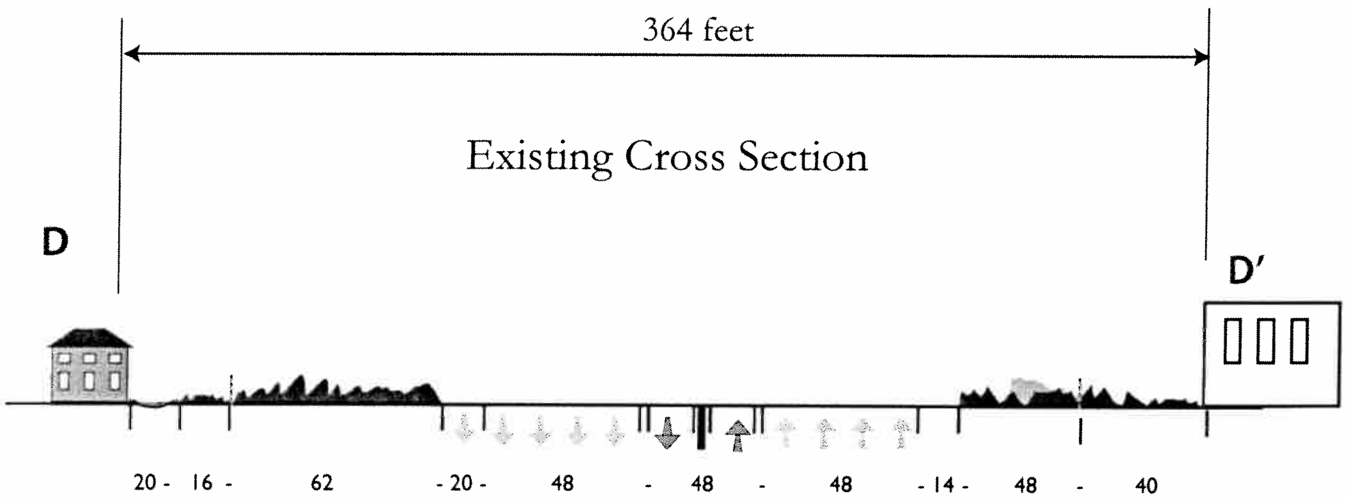


Cross Section D

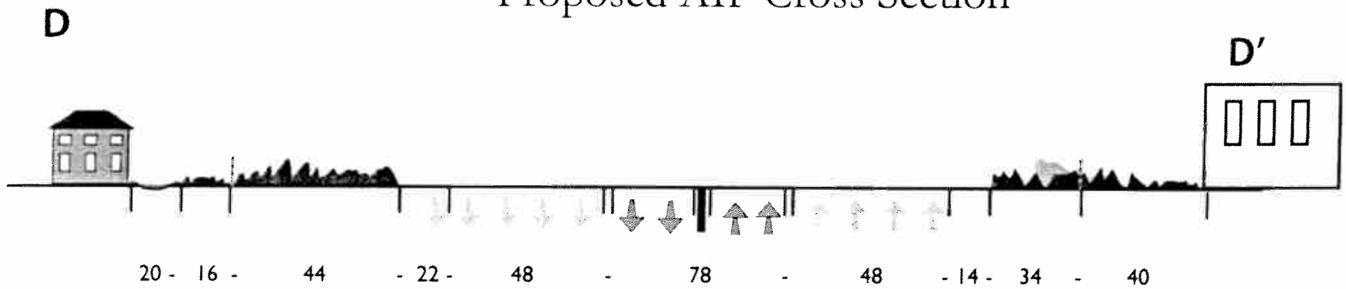
Mission Viejo



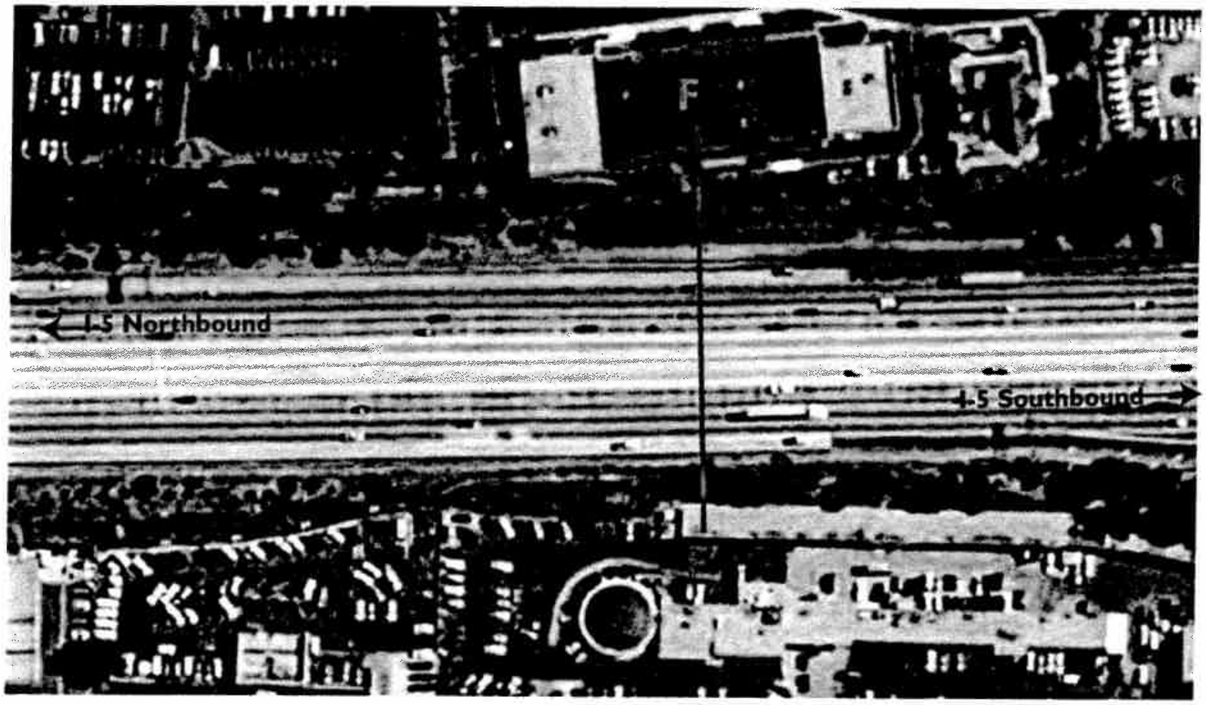
Existing Cross Section



Proposed AIP Cross Section



Cross Section F
Mission Viejo

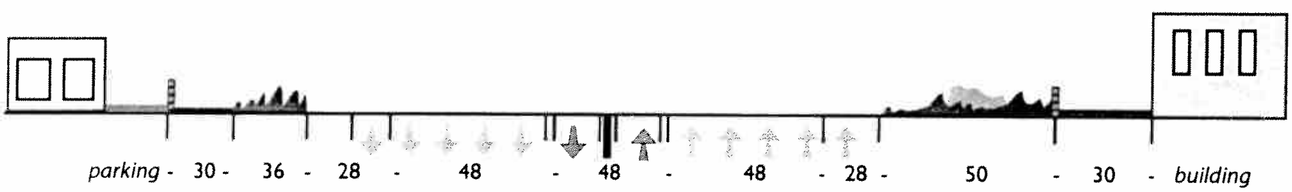


356 feet

Existing Cross Section

F

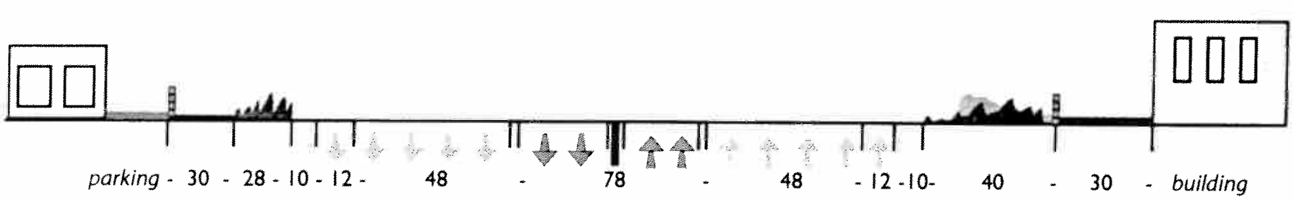
F'



F'

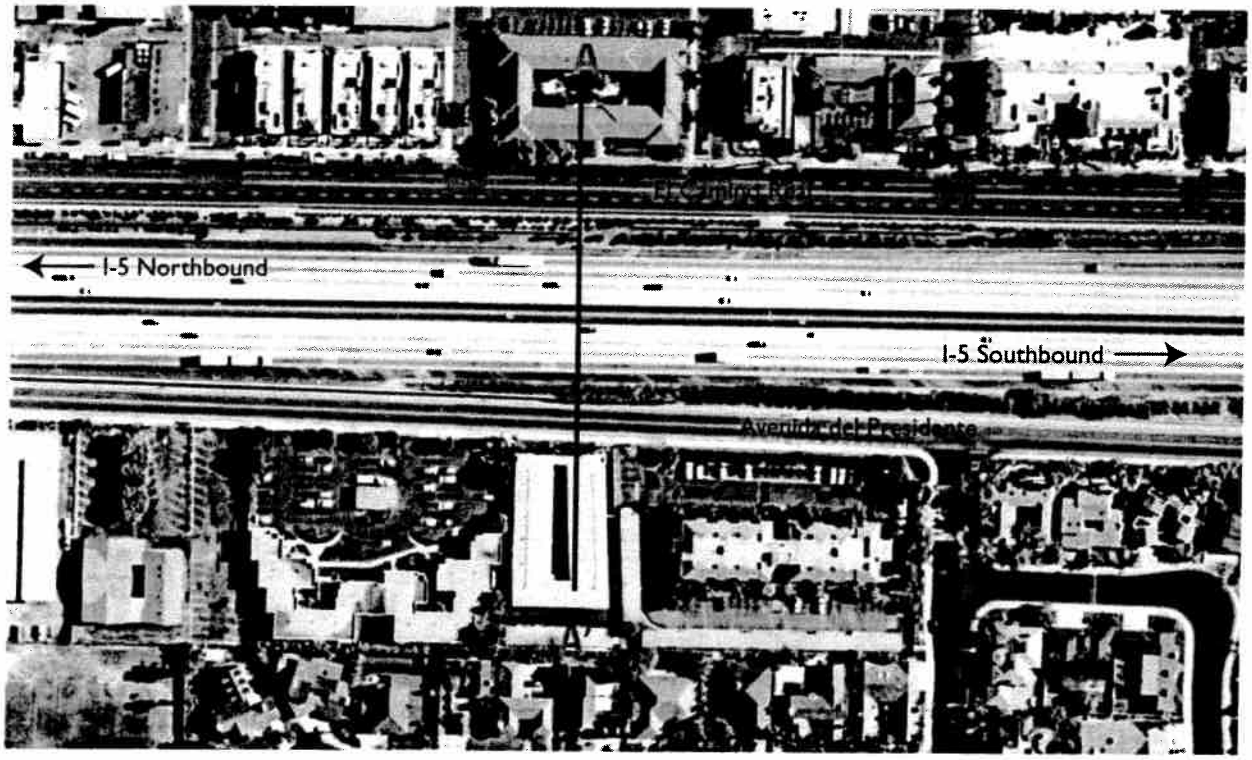
F

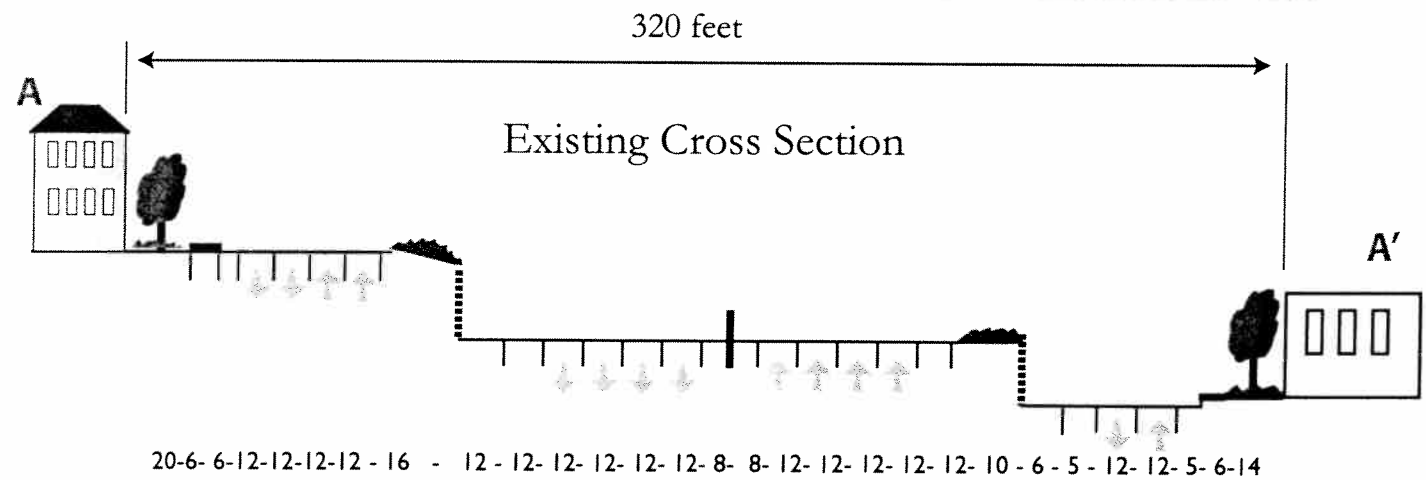
Proposed AIP Cross Section

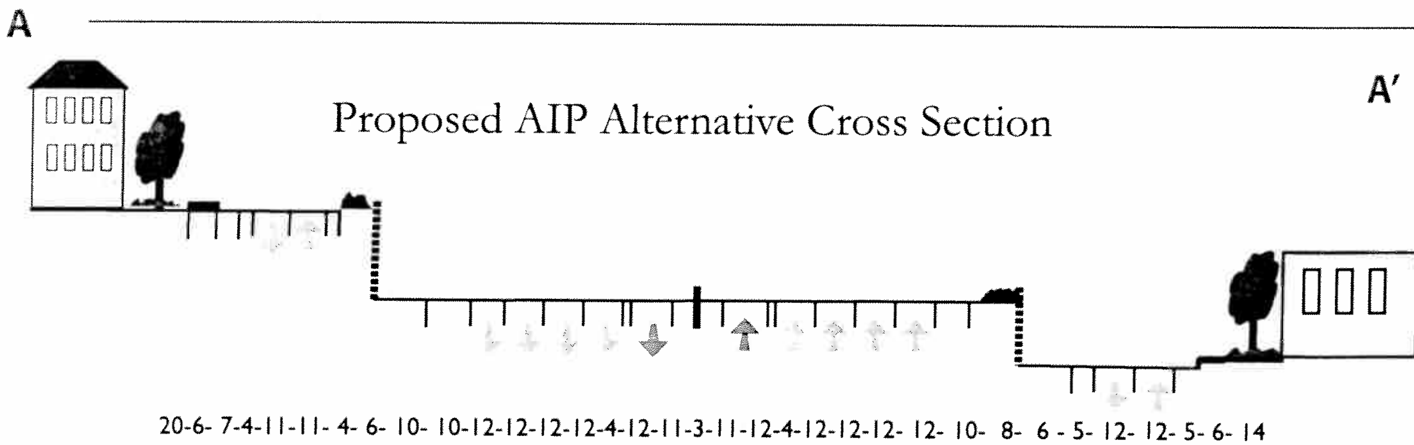


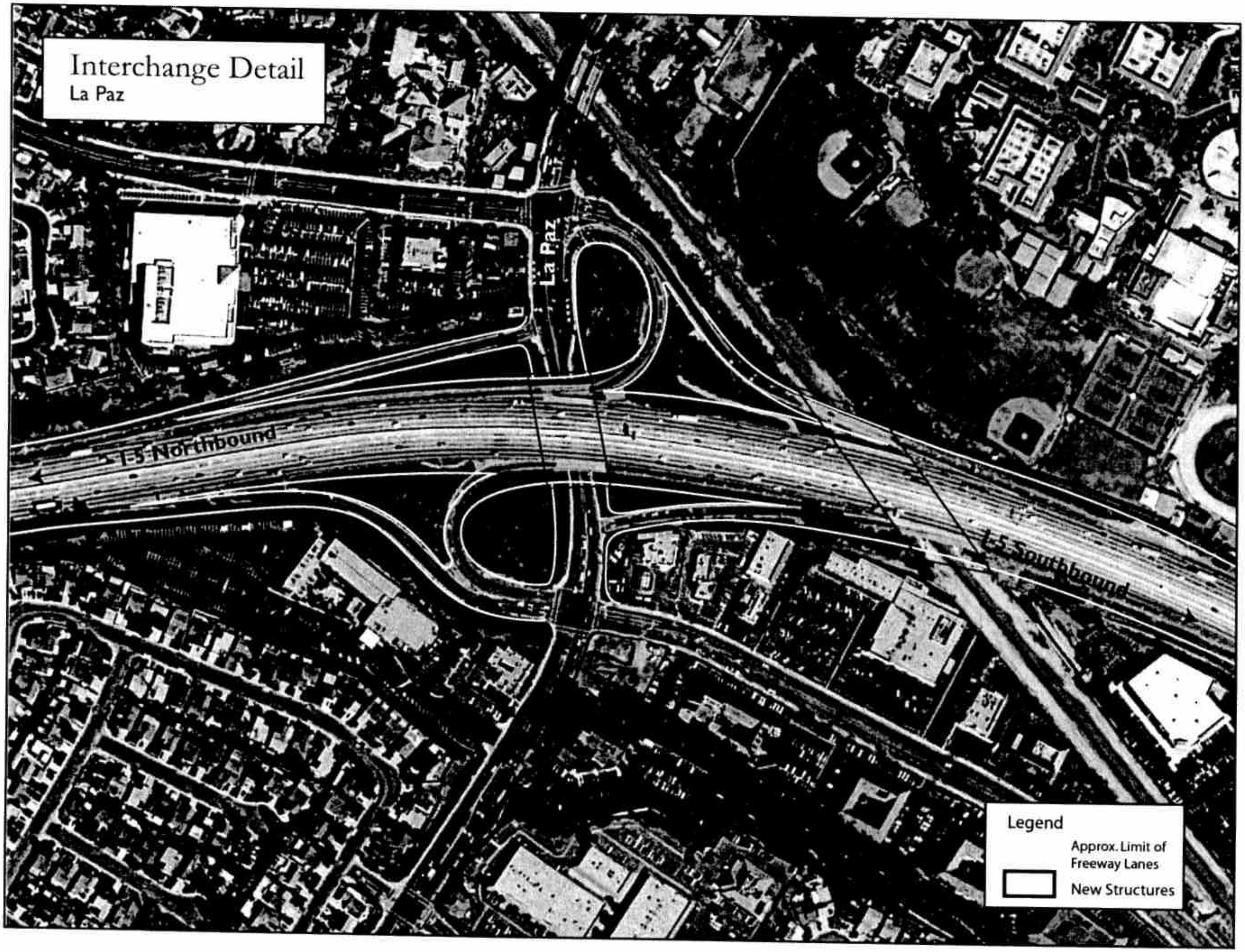
Cross Section S

San Clemente

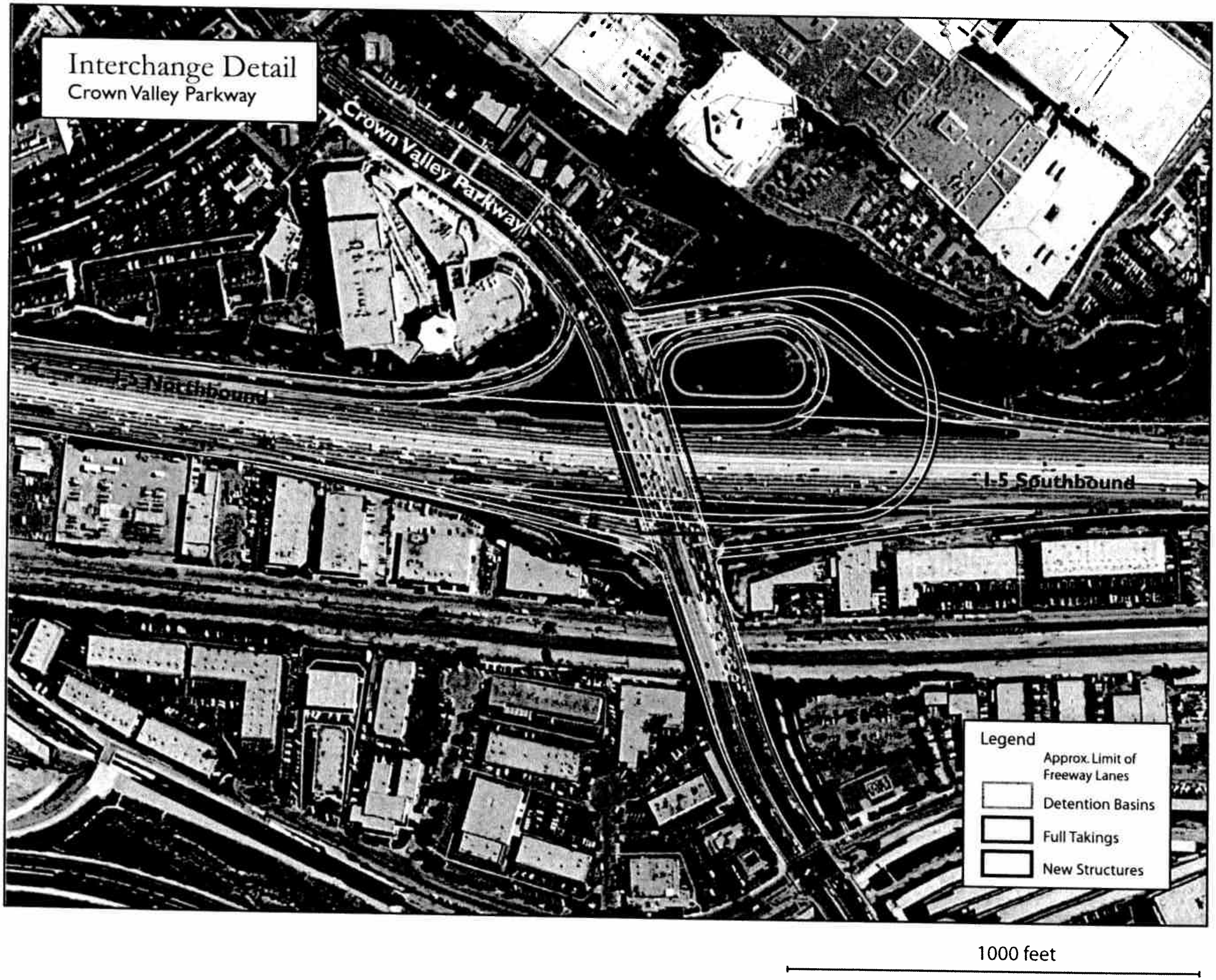


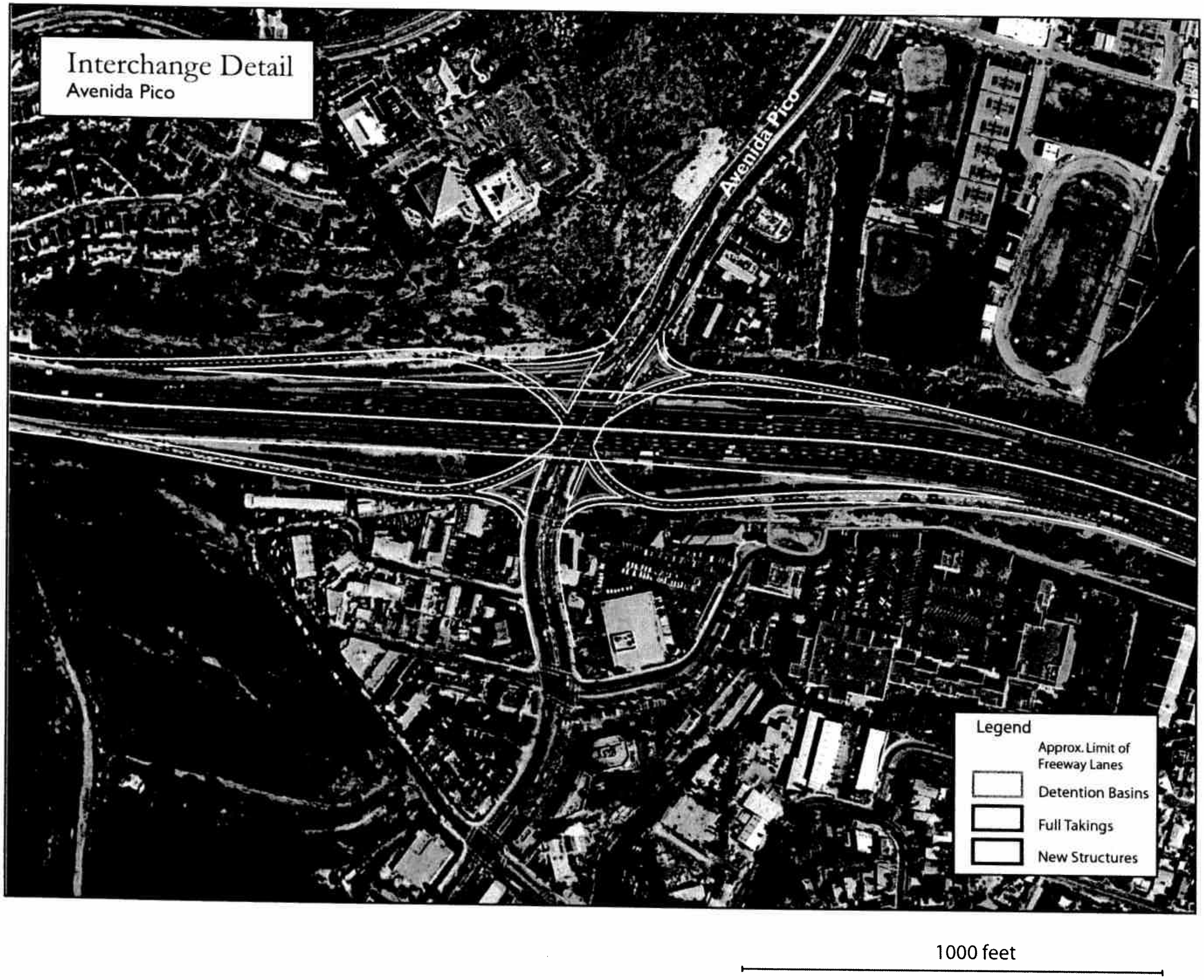





Interchange Detail
La Paz
La Paz
I-5 Northbound
I-5 Southbound
Legend
Approx. Limit of Freeway Lanes
New Structures

1000 feet


Interchange Detail
Crown Valley Parkway
Crown Valley Parkway
I-5 Northbound
I-5 Southbound
Legend
Approx. Limit of Freeway Lanes
Detention Basins
Full Takings
New Structures
1000 feet


Interchange Detail
Avenida Pico
Avenida Pico
Legend
Approx. Limit of Freeway Lanes
Detention Basins
Full Takings
New Structures
1000 feet

Interchange Detail
El Camino Real

1,000 feet

Source Data: NASA 2005

Legend
Approx. Limit of Freeway Lanes
Property Takings
New Structures

LUCINDA GIBSON, PE, PRINCIPAL

lgibson@smartmobility.com

EDUCATION

- Master of Science in Engineering Sciences, Dartmouth College, Hanover, NH, 1988
- Bachelor of Science in Civil Engineering, University of Vermont, Burlington, VT, 1983

PROFESSIONAL EXPERIENCE:

Ms. Gibson helped found Smart Mobility, Inc. in 2001 and is its President. Since starting the company, Ms. Gibson has developed a national practice of innovative transportation engineering designs that meet today's challenges, and advance smarter growth and new urbanism. Her current work at Smart Mobility focuses on context sensitive and multi-modal traffic engineering, preparing alternative transportation solutions for conventional roadway projects, and preparing comprehensive, multimodal community transportation plans. This work includes bicycle and pedestrian planning and design, scenic byway corridor planning, and moving beyond conventional traffic engineering by addressing traffic congestion through improving transportation networks, consideration of land use and development patterns, and broadening the range of options in terms of both routes and modes. Prior to this, she was employed for 7 years at the Two Rivers-Ottauquechee Regional Commission as a Senior Transportation Planner, and for the previous 6 years at Resource Systems Group, Inc.

Selected Project Experience

Decommissioning of the Sheridan Expressway—Ms Gibson analyzed the options for the future of the Sheridan Expressway given the need to reconstruct one of its interchanges with the Bruckner Expressway in the South Bronx, New York City. This work was conducted for the award winning Sustainable South Bronx organization, and also included an evaluation of the economic benefits that would result to the community from the decommissioning.

Burlington Transportation Plan, Burlington, Vermont—Prepared a comprehensive, multimodal transportation master plan for the City of Burlington, Vermont, which included innovative transportation street design guidelines, parking strategies, evaluation for selected "road diets", and development of a town-wide bicycle network.

Obesity and the Built Environment—Conducting research on how the "Built Environment" as part of a team with researchers from the Dartmouth Medical School, Hanover, NH. , Evaluating the effects of transportation infrastructure and land use patterns on the health and obesity levels of children in 30 communities representing a wide array of types in VT and NH. Funded by the National Institute of Environmental Health Sciences.

Two Lane Plan for PA Route 41—Prepared conceptual plan alternative to a Four lane limited access widening proposed by Pennsylvania DOT for PA Route 41 through Chester County, PA. Analysis include use of RODEL for roundabout analysis and design, and VISSIM for developing corridor-wide measures and informational display. Plan is under consideration by PennDOT as an alternative to constructing a four lane limited access highway.

Halfmoon, NY Transportation Analysis and Plan-As part of a project team with Behan Planning Associates to develop an innovative plan for hamlet and mixed use center development in a rapidly growing suburb outside Albany, NY. Plan elements included improves street connectivity within proposed growth areas, pedestrian oriented designs and in the hamlet and mixed use areas, and illustrating access management concepts for the main highway corridors.

Barnard Villages Traffic and Growth Management Plan—Developed a plan for Barnard, Vermont's two village areas, including intersection safety, pedestrian circulation, traffic calming, establishing village identity, re-designing lakefront parking on Silver Lake, and exploring opportunities for infill development.

Chicago Metropolis 2020 Plan for Growth and Transportation-Contributed to this APA Burnham Award-winning project to explore alternative scenarios for growth and transportation investment and management for the Chicago Region. Developed alternative transportation investment strategies and budgets, and prepared modeling input files to analyze these scenarios with an advanced regional TransCAD model.

Dresden School Transportation Committee—Conducted study on the Feasibility of Queue Jump Lane for the Ledyard Bridge Approach in Norwich, Vermont. Reviewed options and obstacles for establishing a bus-only during morning peak hours for buses, with the goal of reducing bus travel time and encouraging school bus and public transit use between Norwich, Vermont and Hanover, New Hampshire.

Prairie Crossing Boulevard Plan, Grayslake, Illinois-Developed context sensitive integrated transportation and land use alternative plan for an abandoned Tollway right-of-way through a new urbanist development in Grayslake, Illinois. Integrated traffic and transportation design into community street network and land use patterns. Plan features landscaped boulevards, roundabouts, and improved street connectivity in the area.

PROFESSIONAL CERTIFICATIONS AND MEMBERSHIPS

- Professional Engineer – P.E., Vermont Board of Professional Engineering, License #6133
- Member, Institute of Transportation Engineers (ITE)
- Member, Congress for the New Urbanism, Transportation Planning Committee
- Member, Board of Directors, CNU New England Chapter of CNU
- Member, ITE/CNU Design Standards Task Force

PUBLICATIONS

Context Sensitive Design Approach for the Route 41 Corridor, Gibson, Lucinda E., and Dee Durham. Presented the Historic Roads National Conference in Portland, OR. Described multi-faceted approach including research, public involvement and education, used to develop a context sensitive plan for improvements to PA Route 41, an NHS route through scenic rural landscapes and Amish farms. April, 2004.

Chicago Metropolis 2020: The Business Community Develops an Integrated Land Use/Transportation Plan, Gibson, Lucinda E., Frank Beal, John Fregonese, Norman Marshall. Presented at the ITE 2003 Technical Conference, *Transportation's Role in Successful Communities* Presented in Fort Lauderdale, FL, 2003.

Functional Classification for Multimodal Planning, Strate, Harry E., Elizabeth Humstone, Susan McMahon, Lucy Gibson and Bruce D. Bender, Transportation Research Record #1606, Transportation Planning, Programming, and Land Use, National Academy Press, Washington DC, 1997.

SPEAKING ENGAGEMENTS (Partial List)

Smart Growth Alternative for the Mountain View Highway Corridor, presented at the Citizens Organized for Smarter Alternatives to the Lehi City Council, Lehi, Utah, March, 2007.

Smarter Alternatives to Highway Projects. Presented at the American Planning Association annual meeting in San Antonio, TX, April, 2006.

Context Sensitive Traffic Engineering for Historic Road Corridors. Presented at the biannual Historic Roads Conference, Portland, Oregon, April, 2004.

Emerging Transportation Planning Techniques for Smart Growth Planning. Presented at the Smart Growth Network annual conference in Burlington, VT, September, 2003.

NORMAN L. MARSHALL, PRINCIPAL

nmarshall@smartmobility.com

EDUCATION:

Master of Science in Engineering Sciences, Dartmouth College, Hanover, NH, 1982
Bachelor of Science in Mathematics, Worcester Polytechnic Institute, Worcester, MA, 1977

PROFESSIONAL EXPERIENCE:

Norm Marshall helped found Smart Mobility, Inc. in 2001. Prior to this, he was at Resource Systems Group, Inc. for 14 years where he developed a national practice in travel demand modeling. He specializes in analyzing the relationships between the built environment and travel behavior, and doing planning that coordinates multi-modal transportation with land use and community needs.

Transit Planning

Regional Transportation Authority (Chicago) and Chicago Metropolis 2020 – evaluating alternative 2020 and 2030 system-wide transit scenarios including deterioration and enhance/expand under alternative land use and energy pricing assumptions in support of initiatives for increased public funding.

Capital Metropolitan Transportation Authority (Austin, TX) Transit Vision – analyzed the regional effects of implementing the transit vision in concert with an aggressive transit-oriented development plan developed by Calthorpe Associates. Transit vision includes commuter rail and BRT.

Bus Rapid Transit for Northern Virginia HOT Lanes (Breakthrough Technologies, Inc and Environmental Defense.) – analyzed alternative Bus Rapid Transit (BRT) strategies for proposed privately-developing High Occupancy Toll lanes on I-95 and I-495 (Capital Beltway) including different service alternatives (point-to-point services, trunk lines intersecting connecting routes at in-line stations, and hybrid).

Central Ohio Transportation Authority (Columbus) – analyzed the regional effects of implementing a rail vision plan on transit-oriented development potential and possible regional benefits that would result.

Essex (VT) Commuter Rail Environmental Assessment (Vermont Agency of Transportation and Chittenden County Metropolitan Planning Organization)—estimated transit ridership for commuter rail and enhanced bus scenarios, as well as traffic volumes.

Georgia Intercity Rail Plan (Georgia DOT)—developed statewide travel demand model for the Georgia Department of Transportation including auto, air, bus and rail modes. Work included estimating travel demand and mode split models, and building the Departments ARC/INFO database for a model running with a GIS user interface.

Regional Land Use/Transportation Scenario Planning

Chicago Metropolis Plan and Chicago Metropolis Freight Plan (6-county region)— developed alternative transportation scenarios, made enhancements in the regional travel demand model, and used the enhanced model to evaluate alternative scenarios including development of alternative regional transit concepts. Developed multi-class assignment model and used it to analyze freight alternatives including congestion pricing and other peak shifting strategies. Chicago Metropolis 2020 was awarded the Daniel Burnham Award for regional planning in 2004 by the American Planning Association, based in part on this work.

Mid-Ohio Regional Planning Commission Regional Growth Strategy (7-county Columbus region)—developed alternative future land use scenarios and calculated performance measures for use in a large public regional visioning project.

Envision Central Texas Vision (5-countyregion)—implemented many enhancements in regional model including multiple time periods, feedback from congestion to trip distribution and mode choice, new life style trip production rates, auto availability model sensitive to urban design variables, non-motorized trip model sensitive to urban design variables, and mode choice model sensitive to urban design variables and with higher values of time (more accurate for "choice" riders). Analyzed set land use/transportation scenarios including developing transit concepts to match the different land use scenarios.

Baltimore Vision 2030—working with the Baltimore Metropolitan Council and the Baltimore Regional Partnership, increased regional travel demand model's sensitivity to land use and transportation infrastructure. Enhanced model was used to test alternative land use and transportation scenarios including different levels of public transit.

Burlington (Vermont) Transportation Plan – Leading team developing Transportation Plan focused on supporting increased population and employment without increases in traffic by focusing investments and policies on transit, walking, biking and Transportation Demand Management.

Roadway Corridor Planning

State Routes 5 & 92 Scoping Phase (NYSDOT) —evaluated TSM, TDM, transit and highway widening alternatives for the New York State Department of Transportation using local and national data, and a linkage between a regional network model and a detailed subarea CORSIM model.

Twin Cities Minnesota Area and Corridor Studies (MinnDOT)—improved regional demand model to better match observed traffic volumes, particularly in suburban growth areas. Applied enhanced model in a series of subarea and corridor studies.

Developing Regional Transportation Model

Pease Area Transportation and Air Quality Planning (New Hampshire DOT)—developed an integrated land use allocation, transportation, and air quality model for a three-county New Hampshire and Maine seacoast region that covers two New Hampshire MPOs, the Seacoast MPO and the Salem-Plaistow MPO.

Syracuse Intermodal Model (Syracuse Metropolitan Transportation Council)—developed custom trip generation, trip distribution, and mode split models for the Syracuse Metropolitan Transportation Council. All of the new models were developed on a person-trip basis, with the trip distribution model and mode split models based on one estimated logit model formulation.

Portland Area Comprehensive Travel Study (Portland Area Comprehensive Transportation Study)—Travel Demand Model Upgrade—enhanced the Portland Maine regional model (TRIPS software). Estimated person-based trip generation and distribution, and a mode split model including drive alone, shared ride, bus, and walk/bike modes.

Chittenden County ISTEA Planning (Chittenden County Metropolitan Planning Organization)—developed a land use allocation model and a set of performance measures for Chittenden County (Burlington) Vermont for use in transportation planning studies required by the Intermodal Surface Transportation Efficiency Act (ISTEA).

Research

Obesity and the Built Environment (National Institutes of Health and Robert Wood Johnston Foundation) – Working with the Dartmouth Medical School to study the influence of local land use on middle school students in Vermont and New Hampshire, with a focus on physical activity and obesity.

The Future of Transportation Modeling (New Jersey DOT)—Member of Advisory Board on project for State of New Jersey researching trends and directions, and making recommendations for future practice.

Trip Generation Characteristics of Multi-Use Development (Florida DOT)—estimated internal vehicle trips, internal pedestrian trips, and trip-making characteristics of residents at large multi-use developments in Fort Lauderdale, Florida.

Improved Transportation Models for the Future—assisted Sandia National Laboratories in developing a prototype model of the future linking ARC/INFO to the EMME/2 Albuquerque model and adding a land use allocation model and auto ownership model including alternative vehicle types.

Peer Reviews and Critiques

C-470 (Denver region) – Reviewed express toll lane proposal for Douglas County, Colorado and prepared reports on operations, safety, finances, and alternatives.

Intercounty Connector (Maryland) – Reviewed proposed toll road and modeled alternatives with different combinations of roadway capacity, transit capacity (both on and off Intercounty Connector) and pricing.

Foothills South Toll Road (Orange County, CA) – Reviewed modeling of proposed toll road.

I-93 Widening (New Hampshire) – Reviewed Environment Impact Statement and modeling, with a particular focus on induced travel and secondary impacts, and also a detailed look at transit potential in the corridor.

Stillwater Bridge – Participated in 4-person expert panel assembled by Minnesota DOT to review modeling of proposed replacement bridge in Stillwater, with special attention to land use, induced travel, pricing, and transit use.

Ohio River Bridges Projects– Reviewed Environmental Impact Statement for proposed new freeway bridge east of Louisville Kentucky for River Fields, a local land trust and historic preservation not-for-profit organization.

Indiana I-69 – Reviewed model analyses from Indiana statewide travel demand model of proposed new Interstate highway for coalition, including the Environmental Law and Policy Center of the Midwest.

Washington, DC region – Reviewed modeling of Potomac River bridge crossings.

Phoenix, Arizona – Reviewed conformity analyses and long-term transportation plan under contract to Tempe, a municipality in the Phoenix region.

Atlanta, Georgia – Reviewed conformity analyses and long-term transportation plan for an environmental coalition.

Daniel Island (Charleston, South Carolina) – Reviewed Draft Environmental Impact Statement for large proposed Port expansion (the "Global Gateway") for an environmental coalition.

Houston, Texas– Analyzed air quality conformity and long-term transportation plan for an environmental coalition.

PUBLICATIONS AND PRESENTATIONS (partial list)

Sketch Transit Modeling Based on 2000 Census Data, with Brian Grady. Presented at the Annual Meeting of the Transportation Research Board, Washington DC, January 2006, and *Transportation Research Record,* No. 1986, "Transit Management, Maintenance, Technology and Planning", p. 182-189, 2006.

Travel Demand Modeling for Regional Visioning and Scenario Analysis, with Brian Grady. Presented at the Annual Meeting of the Transportation Research Board, Washington DC, January 2005, and *Transportation Research Record,* No. 1921, "Travel Demand 2005", p. 55-63, 2006.

Chicago Metropolis 2020: the Business Community Develops an Integrated Land Use/Transportation Plan, with Brian Grady, Frank Beal and John Fregonese, presented at the Transportation Research Board's Conference on Planning Applications, Baton Rouge LA, April 2003.

Chicago Metropolis 2020: the Business Community Develops an Integrated Land Use/Transportation Plan, with Lucinda Gibson, P.E., Frank Beal and John Fregonese, presented at the Institute of Transportation Engineers Technical Conference on Transportation's Role in Successful Communities, Fort Lauderdale FL, March 2003.

Evidence of Induced Travel, with Bill Cowart, presented in association with the Ninth Session of the Commission on Sustainable Development, United Nations, New York City, April 2001.

Induced Demand at the Metropolitan Level – Regulatory Disputes in Conformity Determinations and Environmental Impact Statement Approvals, Transportation Research Forum, Annapolis MD, November 2000.

Evidence of Induced Demand in the Texas Transportation Institute's Urban Roadway Congestion Study Data Set, Transportation Research Board Annual Meeting, Washington DC: January 2000.

Subarea Modeling with a Regional Model and CORSIM", with K. Kaliski, presented at Seventh National Transportation Research Board Conference on the Application of Transportation Planning Methods, Boston MA, May 1999.

New Distribution and Mode Choice Models for Chicago, with K. Ballard, Transportation Research Board Annual Meeting, Washington DC: January 1998.

Land Use Allocation Modeling in Uni-Centric and Multi-Centric Regions, with S. Lawe, Transportation Research Board Annual Meeting, Washington DC: January 1996.

Multimodal Statewide Travel Demand Modeling Within a GIS, with S. Lawe, Transportation Research Board Annual Meeting, Washington DC: January 1996.

Linking a GIS and a Statewide Transportation Planning Model, with L. Barbour and Judith LaFavor, Urban and Regional Information Systems Association (URISA) Annual Conference, San Antonio, TX, July 1995.

Land Use, Transportation, and Air Quality Models Linked With ARC/INFO, with C. Hanley, C. Blewitt, and M. Lewis, Urban and Regional Information Systems Association (URISA) Annual Conference,: San Antonio, TX, July 1995.

Forecasting Land Use Changes for Transportation Alternative, with S. Lawe, Fifth National Conference on the Application of Transportation Planning Methods, Seattle WA, April 1995.

Forecasting Land Use Changes for Transportation Alternatives, with S. Lawe, Fifth National Conference on the Application of Transportation Planning Methods (Transportation Research Board),: Seattle WA, April 1995.

Integrated Transportation, Land Use, and Air Quality Modeling Environment, with C. Hanley and M. Lewis Fifth National Conference on the Application of Transportation Planning Methods (Transportation Research Board), Seattle WA, April 1995.

MEMBERSHIPS/AFFILIATIONS

Member, Institute of Transportation Engineers
Individual Affiliate, Transportation Research Board
Member, American Planning Association
Member, Congress for the New Urbanism
Technical Advisory Committee Member and past Board Member, Vital Communities (VT/NH)

Bob Battalio, P. E.
Principal

Mr. Battalio has extensive experience with flood management, restoration design, coastal engineering, preparation of construction documents, and project management. His training and work experience is focused in the coastal and estuarine areas, wetland and creek restoration design, and waterfront civil engineering projects. He has directed all phases of waterfront and restoration civil works, including field data collection, conceptual design, preliminary design/feasibility analysis, final design/construction documents, and construction management.

Education

M.E., 1985 — Civil Engineering (Coastal Engineering)
University of California, Berkeley

B.S., 1983 — Civil Engineering,
Virginia Polytechnic Institute and State University, Summa Cum Laude

Professional Registration

Civil Engineer, State of California, C41765; State of Washington, 42109

Memberships

Chi Epsilon National Civil Engineering Honor Society
American Society of Civil Engineers
American Shore and Beach Preservation Association (Years 2000–2004 Director, Northern California Vice President)
The Surfrider Foundation
California Marine Parks and Harbors Association (Year 2000 and 2001 State President)

Selected Project Experience

Napa Salt Ponds Restoration Studies, San Pablo Bay / Napa River, California, 1998–2005, for the State Coastal Conservancy and US Army Corps, San Francisco District. Project director for conceptual design, modeling of hydrodynamics, sediment transport and salinity, habitat conversion modeling, engineering feasibility and restoration design. Also, field data collection and analysis, and coordination with surveying and feasibility study and EIS/R preparation, and conformance with Corps' procedures. Mr. Battalio was engineer of record for final design (preparation of construction documents) for the Phase 1 restoration. Phase 1 restoration totaled 3,000 acres of former salt ponds (Ponds 3,4 and 5), and was successfully completed within the estimated budget and schedule in early 2007.

Guidelines and Specifications for Coastal Flood Mapping, 2004. Contributed to a large study performed for the Federal Emergency Management Agency (FEMA). PWA participated in the evaluation and update of FEMA's Guidelines and Specifications for mapping of coastal flood hazards on the Pacific Coast. Mr. Battalio led key technical areas: wave transformations, wave runup and overtopping, definition of the 100-year event in terms of joint occurrence of high wind wave and high water levels, and wind wave generation in sheltered waters such as San Francisco Bay.

Wind Wave Study, DRMS, 2006-7. Provided technical leadership for a focused study of wind wave generation in the Sacramento-San Joaquin Rivers Delta for the Delta Risk Management Study (DRMS). Wind data were analyzed and converted into a spatial probabilistic model of speed and direction. Parametric wind wave generation and wave runup equations were converted into look-up tables to facilitate evaluation for a range of wind and fetch conditions. The tools were provided for use in evaluating the risk in wave-induced damages to flood control levees, within the overall levee failure risk assessment.

Selected Project Experience (continued)

Coastal Flood Mapping, Washington, 2000-2005. Directing analyses of coastal flooding and flood hazard mapping for Whatcom County, Washington (Puget Sound), in cooperation with FEMA Region X. Mapping was accomplished for Sandy Point and Birch Bay. Key issues include tides, water levels, winds, wind wave generation, wave runup, overtopping, and coastal structure evaluation. New methodologies were developed to better represent the flood potential for sheltered waters of Puget Sound, and influenced the development of the Guidelines and Specifications for Pacific Coastal Flood Studies.

Pacifica State Beach Restoration, 2000-2004. Led coastal engineering and geomorphology services provided to the City of Pacifica for restoration of Pacifica State Beach. The project entailed evaluation of the beach morphology including consideration of sea level rise, flooding, erosion and the effect of prior disturbances. Recommendations included a set-back zone from which fill and development were removed, and the geometry to be restored with sands and cobbles consistent with the native materials. The project was constructed in 2004, and was awarded Best Restored Beach (2005) by the American Shore and Beach Preservation Association. The project involved a multi-discipline team and included sand placement for beach nourishment, removal of coastal armoring, demolition of buildings, renovation of restroom / showers and parking, a new bike and pedestrian trail, and storm water treatment wetlands. Also, beach restoration accommodated enhancement of the San Pedro Creek mouth and lagoon for ecologic and coastal / fluvial flood control benefits.

Surfer's Point Coastal Restoration, 2004 – ongoing. Led coastal engineering and geomorphology services provided to the City of San Buenaventura, California, for restoration of a highly disturbed and highly used shore at the Ventura River Mouth. The restoration consists of placing a cobble berm and dunes in the paved area and setting back the bike path and other development 65 ft landward of the existing bike bath. The project is permitted and the design phase started in 2007.

Goleta Beach, California, The Goleta Beach Master Planning and Community Visioning Process developed alternative plans for Goleta Beach County Parks; A key objective was sustainability over 20 years, taking into account long-term environmental change. The proposed study will provide information on the likely future evolution of the shoreline and provide a conceptual design based on the vision developed by the Working Group.

South San Francisco Bay Salt Pond Restoration, 2004- ongoing. PWA is leading a team of consultants to help plan and implement restoration of 15,100 acres of salt ponds in south San Francisco Bay, California. Mr. Battalio provided leadership for Coastal Flood Management and Wetland Restoration Design aspects of the project.

Martinez Regional Shoreline Marsh Restoration Project, California, 1998–2002. Directed construction document preparation construction support activities for this combined flood control and tidal wetlands restoration project at the mouth of Alhambra Creek. The project satisfies mitigation requirements for Caltrans and enhances public access facilities for the East Bay Regional Park District while providing flood control benefits to the City of Martinez. The project entailed dredging and excavation to increase the creek cross-section, restore adjacent wetland terraces, and restore a tidal wetland basin tributary to the creek. The project was successfully constructed, and Caltrans lauded the project with its Excellence in Transportation Award, The Environment (2003). PWA is presently monitoring the project, which has met all performance goals to date.

Selected Project Experience (continued)

Petaluma Marsh Restoration Design, Novato, California, 2001–2007, for the Marin Audubon Society. Project Director for the design of 100-acre tidal wetland restoration tributary to the Petaluma River. Included design of a flood control levee to mitigate tidal flooding and wave action to adjacent rail corridor. The project was successfully constructed in 2005-2007 and PWA is presently providing monitoring of the site evolution and performance.

Crissy Field Wetland Inlet Studies, San Francisco, California, 1999-2007. For the National Park Service, Golden Gate Parks Conservancy, and Presidio Trust, led the coastal processes evaluation of the inlet and adjacent shore following construction of a new tidal lagoon in Crissy Field Park. One study resulted in a quantified conceptual model of inlet closure and natural breaching frequency to aid in the adaptive management of the system and evaluation of the benefits of expansion of the wetland. The work includes significant monitoring, including directional wave spectra, surveys of inlet morphology, and tracking of sand erosion and deposition.

Larkspur Ferry Terminal Maintenance Dredging, California, 1989–2000, for the Golden Gate Bridge, Highway & Transportation District. Project Engineer responsible for construction documents and permit applications for five episodes of maintenance dredging of the Larkspur Ferry Terminal Berthing Basin and Channel, including over 1,000,000 cubic yards of dredging and disposal.

Selected Papers and Published Reports

Battalio, R.T., D. Danmeier and P. Williams, Predicting Closure and Breaching Frequencies of Small Tidal Inlets –A Quantified Conceptual Model. Proceedings of the 30th International Conference of Coastal Engineering, ASCE,(in press 2007).

Garrity, Nicholas J., Robert Battalio PE, Peter J. Hawkes PhD, Dan Roupe' EVALUATION OF EVENT AND RESPONSE APPROACHES TO ESTIMATE THE 100-YEAR COASTAL FLOOD FOR PACIFIC COAST SHELTERED WATERS, Proceedings of the 30th International Conference of Coastal Engineering, ASCE,(in press 2007).

MacArthur, Robert C. , Robert G. Dean and Robert Battalio, **WAVE PROCESSES IN NEARSHORE ENVIRONMENT FOR HAZARD IDENTIFICATION** Proceedings of the 30th International Conference of Coastal Engineering, ASCE,(in press 2007).

Coulton, Kevin G., Bob Battalio, Nick Garrity, Carmela Chandrasekera and Paula Cooper, Coastal Flood Studies in Puget Sound, Washington State, USA, Solutions to Coastal Disasters '02, Conference Proceedings, February 24–27, 2002, San Diego, CA, ASCE, pp 267–281.

Brendan DeTemple, R.T. Battalio, and James Kulpa, Measuring Key Physical Processes in a California Lagoon, Proceedings of the 1999 Conference of the California Shore and Beach Preservation Association, Sand Rights '99, September 23–26, 1999, Ventura, CA, ASCE, pp 133–147.

Battalio, R.T. and R.B. Dornhelm, 1997. Sea level rise in San Francisco Bay, California. Proceedings of the 1997 National Marina Research Conference, International Marina Institute, 16 pp.

Battalio, R.T. and D. Trivedi, 1996. Sediment transport processes at Ocean Beach, San Francisco California. Proceedings of the 25th International Conference, ASCE, *Coastal Engineering* 3(208):2691–2704.

Battalio, R.T. and A. Bertolotti, 1987. Modeling Applications in Coastal Engineering. Proceedings: Coastal Zone '87 Conference, 5th Symposium on Coastal and Ocean Management, Vol. 2, pp. 1630–1643.

Nichol, J., R. Battalio, R. Nathan, R. Boudreau and D. Bombard, 1986. An Example of a Destination Harbor for Pleasure Craft. Bulletin of the Permanent International Association of Navigation Congress, PIANC, No. 55, pp. 33–43.

Battalio, R.T., 1985. A Comparison of Two Methods of Calculating Longshore Sediment Transport Rates Using Field Data. Masters Thesis, U.C. Berkeley, May.

Battalio, R.T., 1984. Selected Techniques for Measuring Directional Wave Spectra. Selected Reports in Ocean and Arctic Engineering, U.C. Berkeley.

Mark Lindley, P.E.
Senior Associate

Mr. Lindley is a water resources engineer with experience in creek and wetland restoration design, construction management, environmental impact/CEQA review, hydraulic design, surface and groundwater hydrology, field data collection, water quality, and remediation. His graduate studies focused on the application of analytical and numerical modeling techniques to hydraulic routing and sedimentation in wetlands, impoundments, detention basins and small sediment control structures.

Mr. Lindley combines his expertise in technical analyses and engineering design with his project management responsibilities to effectively address client needs. His technical work has included analysis and engineering design guidance in creek and wetland restoration projects, as well as hydraulic design guidance for flood control projects and environmental impact analysis for CEQA projects.

Mr. Lindley has managed design and construction of wetland restoration projects including slough channel excavation, levee breaching and lowering, levee and wind wave berm construction, installation of culverts and hydraulic structures, and re-vegetation. He has also provided construction management services for creek restoration projects including the implementation of grade control structures, toe protection, and biotechnical stream bank stabilization methods.

Additionally, Mr. Lindley has managed work efforts to collect data for physical characterization of project sites that include small and full-scale field studies for marsh and estuarine monitoring, stream monitoring, topographic and hydrographic surveying, and groundwater monitoring. Mr. Lindley also has significant experience in the design, construction and operation of soil and groundwater remediation and treatment systems.

Education

M.S., 1994 — Biosystems & Agricultural Engineering,
Oklahoma State University, Stillwater, OK

B.S., 1989 — Mechanical Engineering
University of Kentucky, Lexington, KY

Professional Registration

2004 Civil Engineer, California (License No. C 66701)

Awards

Phoenix Award for Outstanding Master's Student—First Runner-Up

Professional Societies

American Society of Agricultural Engineers

Selected Project Experience

Petaluma Marsh Restoration Project, Construction Management. Marin County, California. Provided construction management and observation services for the Petaluma Marsh Restoration Project, which entailed re-creation of a 102-acre tidal marsh on diked and subsided farmland. The restoration plan included excavation of tidal slough channels, breaching and lowering the existing perimeter levee, creation of wind-wave berms, construction of a significant new levee to protect an adjacent railroad easement, and revegetation.

Martinez Salt Marsh Restoration Project, Post-Construction Marsh Restoration Monitoring. Contra Costa County. Managed mitigation monitoring for a restored salt marsh for the California Department of Transportation. The mitigation project included removing fill, excavating a slough channel network, revegetation, and public access trails and bridges. Post-construction mitigation monitoring involves geomorphic monitoring of marshplain and slough channel development and biological monitoring of vegetation establishment and endangered species habitat development.

Selected Project Experience *(continued)*

Bahia Marsh Restoration Project, Wetland Design. Marin County. Developed wetland restoration design plans to restore both diked and filled baylands to tidal marsh. Restoration designs include grading plans, an excavated slough channel network, breaching and lowering levees, phased water level management with culvert structures, seasonal wetland enhancement, and revegetation. Project is ongoing including support for permitting and EIR processes and development of preliminary through final design drawings and specifications.

Los Capitancillos Wetland Mitigation Project, Wetland Design. San Jose, California. Conducted hydrologic and hydraulic analysis and design of freshwater mitigation wetland facility for Santa Clara Valley Water District. Provided preliminary design of grading, clean soil liner, as well as, inlet and outlet channels and structures. Analyses included water usage, percolation and seepage, rainfall-runoff, and flood routing.

Hamilton Seasonal Wetland Design Guidelines, Wetland Design. Novato, California. Developed design guidelines for seasonal wetland at the Hamilton Airfield. Provided water balance and percolation analyses related of placement of dredged materials at pilot seasonal wetland sites.

Lincoln Creek Restoration, Creek Restoration Design. Auburn, California. Developed Creek Restoration design plans for day-lighting a 500 feet reach of Lincoln Creek within the Auburn School Park Preserve for the City of Auburn. Conducted hydraulic analyses and engineering design for the restored creek to determine design sections and rock sizes that met the client's aesthetic requirements for the park and engineering design/stability requirements. Developed design drawings from conceptual level through 100% construction plans.

Sonoma Baylands Wetlands Demonstration Project, Post-Construction Marsh Restoration Monitoring. Sonoma County, California. Managed a team of surveyors and vegetation, avian, and fish scientists in the monitoring of a marsh restoration project for the U.S. Army Corps of Engineers. The Sonoma Baylands Wetlands Demonstration Project utilized dredge materials to raise the elevation of subsided farmland by several feet to approximately mean tide level to accelerate the establishment of wetland vegetation. Post-Construction Restoration Monitoring is focused on slough channel development, tidal elevation monitoring, sedimentation, bird and fish use, and vegetation establishment.

Alamo Creek Restoration Project, Construction Management. Contra Costa County, California. Provided construction management and observation services for the Alamo Creek Restoration Project which entailed re-creation of a multi-stage channel for 6,000 feet of the deeply incised main branch and channel relocation of 3,000 feet of the east branch. The restoration plan included grading, grade control, bank restoration and vegetative treatments.

Laguna de Santa Rosa, Suspended Sediment/Turbidity Monitoring. Santa Rosa, California. Monitored turbidity, water level and flow at three locations discharging into the Laguna de Santa Rosa for the U.S. Army Corps of Engineers. Turbidity was measured with optical backscatter instruments calibrated to estimate suspended sediment concentrations at each location. Suspended sediment data was utilized with flow data to estimate sediment yield into the Laguna de Santa Rosa to help determine sedimentation rates within the Laguna and to guide decisions on projects to limit sedimentation.

Selected Project Experience *(continued)*

Windemere Development, Surface Runoff Management. Contra Costa County, California. Conducted analysis and design of water quality treatment and flood control detention facilities for the Windemere Development. Developed a sediment management and monitoring plan for a wetland detention basin, collecting runoff from the Windemere Development.

Wendt Ranch Development, Surface Runoff Management. Contra Costa County, California. Conducted hydrologic and hydraulic analysis and design of water quality treatment and flood control detention facilities for the Wendt Ranch Development.

San Francisco Electric Reliability Project, Environmental Impact Review. San Francisco, California. Provided environmental review of a proposed power plant in San Francisco for the California Energy Commission. The environmental review was focused on the utilization of recycled wastewater from the City of San Francisco's combined sewer system and treated onsite for power plant evaporative cooling. In addition, the project site is located in a historic industrial area with existing subsurface impacts from previous land uses that required specific assessment and management to limit risks to onsite workers and neighboring businesses and residences. Other analyses included assessing potential flooding, erosion, and water quality impacts related to the plant's construction and operation.

Soil and Water Resource Compliance Reviews, Storm Water Pollution Prevention Plan review and implementation. Throughout California. Provided technical review of construction and operation Storm Water Pollution Prevention Plans (SWPPPs) for several power plants located throughout California on behalf of the California Energy Commission. Review of SWPPPs to determine if the SWPPPs met the requirements of Conditions of Certification specified in the Energy Commission's licensing decision and included sufficient detail and specified appropriate Best Management Practices (BMPs) to address potential erosion and water quality impacts. Site visits involved inspection of installed BMPs to verify that the measures included in the SWPPP were properly installed in preparation for the rainy season.

Blythe Energy Project - Phase II, Environmental Impact Review. Blythe, California. Provided environmental review of a proposed power plant in Blythe for the California Energy Commission. The environmental review was focused on the impacts of the proposed use of groundwater on the neighboring Colorado River. Other analyses included assessing potential flooding, erosion, and water quality impacts related to the plant's evaporation pond, retention basin, and storm water drainage channels.

Christian Nilsen, P.E.
Associate

Christian Nilsen is a registered Professional Engineer with experience in natural hydrologic systems functioning and stream/wetland restoration design. He has expertise with a variety of hydrologic and hydraulic computer models to aid in the design and prediction of restoration project performance. In addition, he has experience in flood hazard modeling, assessment, and design, including FEMA floodplain mapping and flood map revisions.

Education

M.Sc. 2005 Civil & Environmental Engineering
Stanford University, Stanford, California

B.S. 2001 Texas A&M University, College Station, Texas
Water Resources Engineering

Professional Registration

Civil Engineer, CA, # C69530

Awards

1998 – Engineering Scholars Program
2000 – Chi Epsilon, Civil Engineering Honor Society
2000 – Summer Research Grant, Texas Water Resources Institute

Selected Project Experience
(prior to PWA)

Fairfield Corporate Commons Hydrology Assessment; Solano County, 2005-2007. Project Manager. Assessed impacts of a mixed-use development on flood surface elevations in adjacent Dan Wilson Creek. Prepared a successful FEMA letter of map revision allowing for approval of a bridge vital to the region's transportation. Investigated the hydrology of onsite existing wetlands through one wet season and developed a water balance model to inform future mitigation design. Assessed stormwater management alternatives for the proposed project and designed stormwater infrastructure including various detention and infiltration basins as well as other water quality BMPs.

Jefferson-Martin Substation Wetlands Investigation; San Mateo County, 2005-2006. Project Engineer. Investigated existing seasonal wetlands and developed a hydrologic monitoring program to measure wetlands hydroperiods in a groundwater dependent system. Developed a continuous simulation water accounting model to inform design of mitigation wetlands and the potential for success. Working together with soil scientists and engineers, designed the mitigation wetlands.

Allan Witt Park Stormwater Management Plan; Solano County, 2005-2007. Project Manager. Investigated existing stormwater infrastructure at a proposed infill site and developed a hydraulic model to assess post-project capacity. Recommended and designed vegetated swales as Best Management Practices to enhance stormwater quality at the site. Developed a watershed-wide hydrologic model to study the impact that stormwater detention would have on downstream residents.

Pacific Commons Stormwater Monitoring Program; Fremont, California 2005-2007. Project Engineer. Worked on a design team for a 15-acre stormwater treatment wetland. Worked with the Regional Water Quality Control Board to develop a monitoring program for pollutant loads, and implemented an interim monitoring program to help establish baselines for future programs.

Placer County Water Systems Infrastructure Plan; Placer County, California 2001-2003. Project Engineer. Estimated future treated water demands and developed a water distribution model to evaluate how an existing water network can keep pace with rapid growth. Developed water treatment and distribution alternatives that became the basis for a long-term capital improvement program.

Dry Creek Recycled Water Groundwater Recharge Feasibility Study; Roseville, California. 2002-2004. Task Manager. Investigated the viability of a recycled water recharge program from a hydrologic and a regulatory perspective. Developed conceptual alternatives to recharge water through direct and in-lieu means and performed site investigations at potential direct recharge sites.

Landscape Architects & Planners

RESUME

CAROLYN RADISCH
Urban and Transportation Planner

EDUCATION

University of California, Berkeley,
Masters of City and Regional Planning, 1995
Masters of Civil Engineering, Transportation Engineering, 1995

California Polytechnic State University, San Luis Obispo
Bachelor of Science, 1983
Honors
California Planning Foundation Scholarship Award

PROFESSIONAL PRACTICE

EDAW
San Francisco, California
Senior Associate, 1999 to 2001

ROMA Design Group
San Francisco, California
Associate and Senior Planner, 1990 to 1998

National Transit Access Center, Institute of Urban and Regional Development, UC Berkeley
Research Associate, 1993-1995

PUBLICATIONS

"Travel Choices in Pedestrian versus Automobile-Oriented Neighborhoods," Robert Cervero and Carolyn Radisch, *Transport Policy*, Vol. 3, No. 3, 1996

Original transit and pedestrian related research and drawings included in *Transit Villages for the 21st Century*, Michael Bernick and Robert Cervero, McGraw-Hill, 1997

"Anatomy of a Transit Stop," Bonnie Fisher and Carolyn Radisch, *On the Ground*, Volume 1, No. 2 (1995)

AFFILIATIONS

American Planning Association,
Northern New England Chapter
Congress of the New Urbanism, New England Chapter

COMMUNITY SERVICE

Zoning Board of Adjustment
Hanover, New Hampshire

Board of Trustees, Montessori Children's School
Hanover, New Hampshire

OMAN ANALYTICS

Oman Analytics was founded in 1988 to provide advanced research, professional, and technical services based on computerized analysis to the environmental, engineering, and community planning and development professions.

Michael F. Oman

Mr. Oman is the principal and owner of Oman Analytics. He brings thirty years of professional planning and engineering experience to the firm including Director of Economic Development and of Land Use and Environment for the Boston metropolitan planning agency, the MAPC. He holds bachelors degrees in civil engineering and political science from the Massachusetts Institute of Technology (MIT) and a masters in Urban and Environmental Policy from Tufts University.

Mr. Oman has been a partner in Connery Associates where he developed techniques of computer land use and planning analysis and wrote and implemented plans and regulations for a number of Massachusetts communities. He left Connery Associates, with which he maintains close ties, to found Oman Analytics.

Immediately previous to reactivating Oman Analytics, he has served as Director of Transportation Planning for the Chittenden County Regional Planning Commission/Metropolitan Planning Organization. There, he was responsible for all aspects of transportation planning including the County's first full Long Range (20 year) Transportation Plan under the Federal Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) and Transportation Improvement Program (TIP) for Chittenden County, Vermont's only metropolitan county. This plan has resulted in numerous innovations in Vermont transportation planning including the first land use linked transportation demand model, a thorough understanding of congestion in the metropolitan region, a greater emphasis on maintenance of the existing transportation system and a greater emphasis on pubic transportation. Because of the unique character of Chittenden County, spanning both urban and rural communities, this work was unique in responding to both rural and urban transportation needs in a single approach.

Oman analytics emphasizes traffic and transportation oriented planning services, including comprehensive community plans, corridor and facility planning, modal planning including pedestrian and bicycle plans, transit and vehicular circulation plans, parking including innovative solutions, access management, traffic calming, site development and traffic impact analyses, and traditional neighborhood (TND) plans and context sensitive solutions/designs (CSS/CSD). Special emphasis on the relationship between transportation and land use/development.

Additional services include impact analysis, computer mapping/GIS, general community planning and zoning including master plans, growth management plans and component plans (e.g. traffic and transportation, open space), fiscal impacts analysis, zoning and other regulatory support and capital program and budget where appropriate. Oman Analytics also offers expert witness services relative to traffic and transportation matters.

RESUME OF MICHAEL F. OMAN
PO BOX 216, UNDERHILL CENTER, VERMONT 05490
PHONE: 802 899-3146 E-MAIL: OMANANALYT@AOL.COM

PROFESSIONAL EXPERIENCE

1988 Pres **Principal, Oman Analytics, Underhill Center, VT** Community planning and Geographic Information Systems (GIS) services including traffic and transportation analysis and plans, housing planning and census analysis, open space, land use, economic development, fiscal analysis and master plans. Special emphasis on transportation/land use relationships.

1992 1997 **Transportation Director, Chittenden County Regional Planning Commission, Essex Junction, VT** Responsible for all aspects of transportation planning including Long Range Transportation Plan and Transportation Improvement Program (TIP) for Chittenden County, Vermont's only metropolitan county. Staff director for Metropolitan Planning Organization.

1984 1988 **Principal, Connery Associates, Winchester, MA** Responsible for a complete range of land use and community planning consulting, including project management and client relations, land use, economic, and environmental analysis, master planning and component plans, public participation and implementation, including zoning, subdivision and other regulations, capital facilities planning and final adoption of plans.

1979 1984 **Metropolitan Area Planning Council, Boston, MA Director of Land use and Environmental Planning; Director of Economic Development; Principal Planner** Provided planning services in land use, environmental protection and economic development to 101 cities and towns in metropolitan Boston. Services included groundwater protection, open space planning, downtown revitalization, industrial space planning, traffic and transportation and urban design.. Supervised a staff of six professional planners.

1978 1979 **Allen and Demurjian, Inc. Civil Engineers, Boston, MA Project Engineer** Site design, specifications and estimation for a variety of development projects.

1969 1973 **U.S. Army Corps of Engineers, Waltham, MA: Civil Engineer; Systems Programmer and Analyst** Hydrologic systems and data acquisition

EDUCATION

MA, 1975 Tufts University, Urban and Environmental Policy
SB, 1969 Massachusetts Institute of Technology, Civil Engineering
SB, 1969 Massachusetts Institute of Technology, Political Science

PROFESSIONAL AFFILIATIONS

American Planning Association
Institute of Transportation Engineers

Oman Analytics: Selected Projects

City of Burlington, VT Comprehensive Transportation Plan (Current) With Smart Mobility, Inc and Office of Robert White, develop comprehensive transportation plan for the City, including vehicular, pedestrian and bicycle circulation, transit, and parking strategies, and projects.

Pedestrian Safety Improvement Study, City of Winooski, VT (9/05) Evaluate pedestrian access options, and safe route to school at the Winooski Education Center.

Traffic Impact of Sewer Expansion; Town of Milton, VT (for CCMPO)(8/02) Estimate likely development impact of proposed sewer extension in Milton and evaluate likely traffic impacts.

Town of St Johnsbury: Historic Main Street Partnership Study; Assessment of Historic Buildings, Site, and Parking & Wayfinding (8/01) With Vermont Design Institute, detailed parking studies and assessment of actual parking demand in downtown; parking management strategy.

City of Burlington: Redesign of Shelburne Road "Rotary" (2/02) Traffic analysis and design for replacement of non-standard and dangerous intersection at gateway to Burlington on critical Shelburne Rd (US Route 7) entrance with Robert White, Landscape Architects.

Chittenden County Metropolitan Planning Organization and Northwest Regional Planning Commission: US Route 7 Corridor Management Plan Winooski to Georgia (9/01) In collaboration with Kathleen Ryan, Landscape Architect, developed comprehensive corridor management strategy and plan that addresses roadway, pedestrian and streetscape, and extensive public transportation improvements, and development strategies that will enhance both transportation and community life.

Addison County Regional Planning Commission and Town of Middlebury; Middlebury/US Route 7 Corridor Management Plan (11/98) In collaboration with Kathleen Ryan, Landscape Architect, and Community Planning and Design, developed a comprehensive corridor management plan consisting of roadway, pedestrian and streetscape improvements and potential development controls that provide realistic solutions in this difficult corridor.

Village of Essex Junction: Traffic Impact Analysis for Whitcomb Farm Developmet. (8/98) Retained by Town to provide an unbiased analysis of the traffic impact associated with large residential development project.

Traffic Calming and Alternative Transportation for Five Addison County Towns, 9/97 Addison County Regional Planning Commission, 9/97 In collaboration with Kathleen Ryan, Landscape Architect, developed traffic calming plans for six villages in Addison county heavily impacted by through arterial traffic.

Chittenden County Long Range Transportation Plan, Chittenden County Metropolitan Planning Organization (MPO), 1996 As Transportation Director, developed the County's first full Long Range Transportation Plan under the Federal Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) providing for the investment of approximately $400M of transportation improvements over the next twenty years and addressed all modes in Vermont's only urban metropolitan area.

Appendix I

- July 2005 Smart Mobility Report

smart mobility

Smart Mobility, Inc.
16 Beaver Meadow Road
Aldrich House #3
P.O. Box 750
Norwich, VT 05055
(802) 649-5422
www.smartmobility.com

A Practical, Cost Effective, and Environmentally Superior Alternative to the Foothills South Toll Road for the South Orange County Transportation Infrastructure Improvement Project

Prepared By:

Norman L. Marshall

Prepared for the California State Parks Foundation

July, 2005

Summary

The Transportation Corridor Agencies (TCA) present voluminous traffic modeling and analysis attempting to show that a new toll corridor is necessary to accommodate future traffic needs in South Orange County.[1] But a close look at the numbers and analysis presented show that a refined series of arterial and I-5 improvements could practically and cost-effectively meet future traffic demand without sacrificing irreplaceable natural resources.

TCA rejected a similar alternative (the Arterial Improvements Plus or "AIP" alternative) from full consideration in the DEIS/SEIR because of purported high displacement impacts and associated costs. Notably, these purported displacements and costs were not supported by any description of methodology and assumptions, either in the DEIS/SEIR or in its underlying technical reports. This critical gap precludes assessment of whether these costs are real. Moreover, displacement impacts for roadway projects can often be reduced or eliminated through design refinements, such as re-striping, widening on one side where no displacement would result and moving the centerline, not widening at all on sections where projected demand is low, *The TCA never engaged in any effort to refine the design of the AIP alternative to avoid displacement.*

In fact, a refined version of the AIP alternative, which includes limited I-5 widening and arterial improvements, could provide superior traffic benefits—and minimize or eliminate displacement impacts and costs—completely avoiding the heavy environmental cost of building a new toll road through south Orange County parks and ecological reserves. Moreover, if this refined alternative included High Occupancy Toll (HOT) lanes instead of High Occupancy Vehicle (HOV) lanes on the I-5 assumed in the AIP alternative, an important source of new revenue would be created to help fund the project while maximizing efficiency.

This refined scenario represents a balanced approach, combining the addition of one HOV or HOT lane on high-demand segments of I-5 with a set of arterial improvements similar to those tested in the AIO (Arterial Improvements Only) alternative of the DEIR/DEIS. The arterial improvements might include expanding of Antonio Parkway/Avenida La Pata to an eight-lane smart street from Oso Parkway to San Juan Creek Road and to a six-lane smart street from San Juan Creek Road to Avenida Pico, and other improvements, accomplished so as to avoid displacement impacts.

[1] *Environmental Impact Statement/Subsequent Environmental Impact Report and Draft Section 4(f) Evaluation for the South Orange County Infrastructure Improvement Project* (DEIS/SEIR) and the associated *Traffic and Circulation Technical Report* (TCTR)

Traffic Performance

The traffic performance of a combined arterial/I-5 approach such as the AIP alternative compares favorably with *any* of the toll road corridor alternatives proposed by TCA, whether the performance metric is reducing future *Interstate 5* congestion, reducing vehicle delay on the arterial system, or reducing total vehicle hours of travel.

Metric 1: Reduction of Future I-5 Congestion

The Traffic Technical Report summarizes projected 2025 congestion on I-5 in terms of Percent of Daily I-5 VMT [vehicle miles traveled] in the Study Area Under Congested Conditions. For the No Action alternative, the statistic [percentage increase?] is 16.9%. The values for the 11 new toll road alternatives range from 2.4% - 15.2%. *The AIP alternative outperforms all the new toll road alternatives, with only 2.2% of daily I-5 VMT operating under congested conditions in 2025.*

Metric 2: Vehicle Delay on Arterials

The Traffic Report summarizes year 2025 arterial roadway congestion in terms of *Vehicle Delay on the Arterial System.* For the No Action alternative, the number is 9,944 **hours of delay during the morning and afternoon peak traffic periods** . The values for the 11 new toll road alternatives range from 7,677 to 8,708. *Again the AIP alternative outperforms all toll road alternatives, with a value of 7,589.*

Metric 3: Total Vehicle Hours Traveled

Finally, the Traffic Report analyzes total vehicle hours of travel (VHT) for the modeled area of impact. Compared to the No Action alternative, the 11 toll road alternatives reduce VHT by 0.01% to 0.16%. The combined scenario is shown as reducing VHT by a comparable 0.08%.

It is critical to bear in mind that even under TCA's flawed approach to traffic modeling, the combined alternative under-performs the best performing toll road alternative by only a *small fraction of one percent.* In reaching these numbers, TCA declined to employ universally accepted modeling procedures that take into account the effects of congestion on trip distribution by using "feedback loops" to provide a far more accurate projection of traffic impacts – despite TCA's acknowledgement that such modeling would reduce the traffic benefits of the toll road alternatives relative to the other alternatives. TCA's stated rationale for this decision was that the more accurate modeling would likely have shown a relative improvement in the performance of the AIP of *up to one percent* – a difference it described as "relatively minor." (Traffic and Circulation Technical Report "TCTR", p. 1-10) But even a one percent difference *is over ten* times the difference between the best performing alternative and the AIP using TCA's own calculations.

The TCA's conclusion that a toll road corridor alternative will most effectively reduce Vehicle Hours Traveled is therefore undermined by *the TCA's own methodology and assumptions.* Indeed, more accurate modeling using standard feedback loop procedures would likely show that a combined alternative would *outperform* the toll toad alternatives in VHT reduction.

Displacement Impacts and Costs

The DEIS/SEIR rejects a combined alternative as infeasible based on "project costs" and because it purportedly "displaces 898 residences." (DEIS/SEIR, ES-16) The costs are in large part due to the purported displacements, so the estimate of displaced residences is critical to the feasibility determination. *The*

DEIS/SEIR fails to document, however, how the displacements were estimated. A technical report entitled Draft Relocation Impacts Technical Report: Final (December 2003) states the properties were counted if they fell within "limits of disturbance." While there are some definitions as to when properties are considered disturbed, no information is given as to how the area of disturbance was calculated along existing roadways. Since the AIP alternative would generally require a mere 13-foot widening on each side of I-5, the estimated displacements appear on their face to be unrealistically high.

In any event, TCA failed to take into consideration how even minor refinements to the design of the AIP might greatly reduce or even eliminate these impacts and costs. These include refinements such as re-striping, widening on one side and moving the centerline, or not widening at all on sections of the I-5 and selected arterials where projected future traffic demand is low. Such a refinement process is critical when working within the constraints of the built environment. Simply laying down a wide buffer of potential impacts and counting properties touched does not represent a serious consideration of non-toll road alternatives.

This refusal to refine the AIP or other non-toll road alternatives markedly contrasts with the numerous variations of a toll road alternative considered in the DEIR/DEIS that were developed to reduce negative impacts such as displacement. The AIP alternative should have similarly been refined to identify the design capable of providing maximum benefits while minimizing displacements and costs.

Refinements might include no widening of the I-5 along segments modeled as uncongested assuming implementation of the arterial improvements. Where I-5 lanes need to be added, the centerline could be shifted slightly so that widening impacts only one side of the road where needed to avoid or minimize displacement impacts. Similarly, alternative alignments and re-striping could avoid or minimize displacement for the arterial widening. By avoiding displacement impacts, these modifications are likely to be cost effective. The documentation reflects that none of these obvious refinements were considered.

Conversion to HOT lanes should also be seriously considered. HOT lanes have been very successful on SR-91 in Orange County and I-15 in San Diego County. The San Diego Association of Governments has HOT lanes on I-5 in San Diego County in its adopted long-range transportation plan. Since South Orange County is the bridge between the greater Los Angeles and San Diego regions, an unbroken set of HOT lanes would encourage higher vehicle occupancy rates. These higher vehicle occupancy rates would reduce traffic volumes not only on I-5 but also on arterials and local roads used to access I-5. The HOT lanes also would provide an important source of new revenue.

In sum, a toll-road corridor alternative is demonstrably not necessary to meet future traffic goals. Indeed, a balanced set of arterial and HOV/HOT lane improvements on the I-5 will likely provide superior traffic benefits. Purportedly prohibitive economic and displacement costs can be reduced or eliminated through refinements, an exercise that TCA inexplicably failed to undertake. This exercise must proceed, and further independent analysis performed, before demonstrably well-performing I-5 widening alternatives can be rejected on economic grounds.

The Combined Alternative/AIP Alternative Analysis in DEIS/SEIR

The DEIS/SEIR models an I-5 scenario that includes adding 1 general purpose lane and 1 HOV lane in each direction throughout most of the study corridor. This would be costly and could have significant impact on adjoining property owners. In contrast, the combined scenario adds only a single lane (HOV) in each direction. This would be much less costly and have much less impact on adjacent property owners.

The combined scenario represents a balanced approach, combining limited capacity expansion on I-5 with arterial improvements. I-5 improvements include: "the addition of spot mixed-flow auxiliary lanes south of Ortega Highway and south of Avenida Pico, and the reconstruction of several existing I-5 interchanges." (TCTR, p. 2-23) The arterial improvements in the combined scenario are the same as those in the AIO alternative described in the DEIS/DEIR. Specifically, they include:

> *... the expansion of Antonio Parkway/Avenida La Pata to an eight lane smart street from Oso Parkway to San Juan Creek Road and to a six-lane smart street from San Juan Creek Road to Avenida Pico. In addition, Smart street technologies would also be included on Ortega Highway between Antonio Parkway/Avenida La Pata and I-5, Camino Las Ramblas between Avenida La Pata and I-5, and Avenida Pico between Avenida La Pata and I-5. Smart street technologies include a combination of advanced traffic management strategies such as traffic signal coordination, real time monitoring and surveillance, and traveler information, as well as modest physical improvements such as additional turn lanes at intersections. The effectiveness of providing grade separation at the intersections of Antonio Parkway/Oso Parkway, Antonio Parkway/Crown Valley Parkway, Antonio Parkway-La Pata Avenue/Ortega Highway, and Avenida La Pata/Avenida Pico will also be considered in the evaluation of the AIO Alternative. (TCTR, p. 2-19, 2-23)*

The combined approach, in the form of the AIP alternative, is rejected from full consideration in the DEIS/SEIR for the reasons given in the paragraph below.

> *Arterial Improvements Plus HOV and Spot Mixed-Flow Lanes on I-5 (AIP) Alternative.* *The AIP Alternative performed poorly in project costs and in cost per hour of travel time saved; well for traffic operating in congestion on I-5; moderately for hours of travel times savings; well in impacts to riparian ecosystems, CSS and gnatcatchers; and it displaces 898 residences. Based on the very poor performance of this Alternative related to project costs and socioeconomics, the Collaborative agreed to eliminate the AIP Alternative from consideration in the EIS/SEIR. (DEIS/SEIR, p. ES 16)*

As this paragraph indicates, the rejection of this alternative was based entirely on "costs and socioeconomics." TCA concedes that the combined scenario performs "well" for I-5 congestion, impacts to riparian ecosystems, CSS and gnatcatchers. It is also listed as "moderate" for "hours of travel time savings" but it actually performs excellently, as I explain below. The only negative factor identified by TCA – the purported displacement and related costs -- are unsupported by any evidence in the record that has been made available to the public. More importantly, any displacement that would be caused under the configuration modeled might be drastically reduced or eliminated through feasible refinements, none of which were considered by TCA.

Future I-5 Congestion

Reducing future congestion on I-5 is one of the critical goals of the South Orange County Transportation Infrastructure Improvement Project. The DEIS/SEIR analysis shows that construction of a new toll road is less effective in reducing future congestion on I-5 than are improvements on I-5 itself.

> *As shown in Table 4-42, the I-5 and AIP Alternatives generally have less congestion on I-5 than the other Build Alternatives. This is because both of these Alternatives include improvements to I-5, where substantial*

N

DEPARTMENT OF TRANSPORTATION
District 12
3337 MICHELSON DRIVE, SUITE 380
IRVINE, CA 92612-8894
PHONE (949) 724-2007
FAX (949) 724-2019
TTY 711 or (949) 756-7813

Flex your power!
Be energy efficient!

January 7, 2008

Tay Dam
Federal Highway Administration
650 Capital Mall, Suite 4-100
Sacramento, California 95814

Dear Mr. Dam:

The California Department of Transportation (Department) reviewed the September 2007 version of "An Alternative to the Proposed Foothill South Toll Road: The Refined AIP Alternative", a report prepared by Smart Mobility, Inc. (SMI Report) in collaboration with Philip Williams & Associates, Ltd., ORW Inc., and Oman Analytics. The Department finds that the SMI Report and its conclusions are not supported by adequate engineering and technical analysis.

The SMI Report proposes refinements to the Transportation Corridor Agencies' Arterial Improvement Plus (AIP) Alternative to reduce right of way impacts associated with the AIP alternative and states that the SMI Report alternative is functionally identical to the AIP.

The SMI Report does not provide supporting analysis for traffic capacity, traffic operations, application of standards and practicality of horizontal and vertical geometric design, and fails to address cumulative infrastructure impacts (such as utilities), construction staging impacts and other constructability concerns. Attachment "A" details Department concerns specifically related to missing interchange details and missing traffic performance information in the SMI Report alternative. The alternative presented in the SMI Report does not meet Department standards, and in our view does not meet applicable engineering standards of care. Therefore, the Department cannot support the proposed design refinements or conclusions.

Please call me at (949) 440-3440 or Lisa Ramsey, Office Chief/Corridor Project Manager at (949) 724-2102 if you have additional questions on the information provided herein.

Sincerely,

Cindy Quon

CINDY QUON
Director
District 12

Attachment

c: J. Beil, Caltrans
L. Ramsey, Caltrans
T. Margro, TCA
D. Lowe, TCA

Although not a comprehensive list, following are some California Department of Transportation (Department) concerns and comments concerning the Smart Mobility Report (SMI Report) dated September 2007.

1. The Interchange Detail Sheets, also described as Interchange Area Concepts, show interchanges with only minimum associated right of way impacts. The proposed Interchange Detail Sheets show that Department Single Point Interchange (SPI) Guidelines and Department Highway Design Manual (HDM) guidelines are not accurately represented. Therefore, interchange right of way impacts identified in the SMI Report appear to be misrepresented due to the following:

   a. *El Toro Interchange:*
      i. The right turn on ramp alignments from El Toro road do not merge safely with the main segment of the onramps, and are not in conformance with design standards.
      ii. Detail concept drawings are missing the following details: merge, storage, auxiliary lanes and shoulders.
      iii. The I-5 undercrossing would require complete reconstruction to provide proper vertical clearances and horizontal sight distances.
      iv. Impacts associated with vertical clearances and necessary profile changes are not shown.
      v. Minimum distance between ramp intersections and local road intersections are not met.

   b. *La Paz and Oso Parkway, and El Camino Real Interchanges:*
      i. Horizontal and vertical geometric data is not provided in the report and impacts cannot be ascertained.

   c. *Crown Valley Parkway Interchange:*
      i. The right turn on ramp alignments from Crown Valley Parkway do not merge safely with the main segment of the on ramps, and are not in conformance with design standards.
      ii. It is unclear how the southbound off ramp flyover gets under Crown Valley Parkway and has the required vertical clearance over the I-5 freeway; and then is able to span the northbound ramps and touch down in just a few hundred feet just prior to the intersection. Or, if the southbound off ramp flyover goes over Crown Valley parkway, then the ramp will need to start further back to achieve an acceptable profile. These impacts are not clearly shown.
      iii. Required auxiliary, merge and storage lanes, and shoulders are missing.

- iv. Southbound off ramp merge conflicts with signalized interchange. Potential weave related issues are not addressed. Merge lane ends at existing right turn only lane.
- v. Access Control is not attainable without removal of adjacent intersection. This would have additional impacts, including re-routing traffic and increasing traffic in other locations.
- vi. The profile of Crown Valley would need to be raised if a ramp flyover or SPI were installed (which would require the reconstruction of both Camino Capistrano and Crown Valley Parkway). Associated traffic impacts not identified.
- vii. Horizontal curve hidden by Crown Valley over crossing and horizontal curves following vertical crests created. Associated sight distance restrictions are not addressed.
- viii. Reverse curves should provide adequate tangent section for superelevation transitions.
- ix. Horizontal and vertical geometric data and/or assumptions are not provided in the report.
- x. Length of southbound off ramp requires a second passing lane (HDM 504.3).
- xi. Side slopes are not identified (HDM 304.1)

d. *Ortega Highway Interchange:*

- i. The detail concept drawing is missing dedicated right turn lanes; and merge, auxiliary, and storage lanes and shoulders.
- ii. The right turn on ramp alignments do not merge safely with the main segment of the onramps, and are not in conformance with the design standards.
- iii. Impacts associated with vertical clearances and necessary profile changes are not shown.
- iv. Minimum distance between ramp intersections and local road intersections are not met.

e. *Pico Interchange:*

- i. The concept drawing is missing the following: dedicated right turn lanes on Pico; and merge, auxiliary, storage lanes and shoulders.
- ii. The right turn on ramp alignments do not merge safely with the main segment of the onramps, and are not in conformance with the design standards.
- iii. Pico is on a horizontal curve. The horizontal curve will make it difficult for the driver to determine the proper lane as the driver approaches the intersection.

iv. Impacts associated with vertical clearances and necessary profile changes are not shown.

2. The SMI Report claims that "The interchange designs as shown for the AIP-R alternative provide sufficient capacity to serve the I-5 interchange ramp volumes cited in the Supplemental Environmental Impact Report…" However, the SMI Report does not provide any SPI level of service analysis for review. The SPIs would not provide similar levels of service as the interchange designs listed in TCA's Traffic and Circulation Technical Report, Table E-40 for AIP. The following is a rough assessment of the Table E-40 AIP traffic numbers and levels of service, and how the traffic volumes may be reflected in an SPI.

   Pico/I-5: southbound direct and loop on ramp PM peak hour volumes of 370 and 1410 provides level of service A and E respectively. If a SPI or diamond interchange were provided, then the combined peak hour volumes of 1780 vehicles provide a level of service F.

   Crown Valley/I-5: northbound direct and loop on ramp PM peak hour volumes of 1810 and 900 provides a level of service F and D respectively. If an SPI or diamond interchange were provided, then the combined volumes of 2710 cars provide a level of service F. The AM Peak hour volumes for northbound direct on ramp and northbound loop on ramp of 1570 and 720 provide level of service F and B respectively. If an SPI or diamond interchange were provided, then the combined peak hour volumes of 2290 vehicles provide a level of service F.

   Ortega/I-5: northbound direct and loop on ramp PM peak hour volumes of 1720 and 800 provide level of service F and A respectively. If an SPI or diamond interchange were provided then the combined volumes of 2520 vehicles provide a level of service F. Southbound off ramp PM peak hour level of service is at Level of service F and E with mitigation.

   The Department typically manages mainline I-5 freeway traffic by metering on ramps along the entire corridor. The affected on ramps should have adequate storage in order to accommodate vehicles queued up behind ramp meters without disrupting traffic on the local arterials. The Interchange details shown in the SMI report do not reflect any additional widening required for ramp storage capacity, which may have led to an incorrect assessment of right of way impacts.

   Ramp meters should meet various criteria to perform effectively. For example, vehicle storage capacity estimates for metered ramps of between 5 and 10 percent of ramp volumes are recommended. For a single lane metered ramp, a 4-second cycle (allowing for a discharge rate of 900 VPH (vehicles per hour)) is the most rapid cycle recommended. Similarly, for a 2 lane metered ramp, a 6-6.5 second cycle (allowing for a discharge rate off 1100 VPH) is the most rapid recommended rate. Furthermore, when ramp volumes exceed 1500 vph, a 1000' minimum length of auxiliary lane should be provided beyond the ramp convergence point. For example, an on ramp with volumes similar to northbound Ortega, with 2500 vph volume would have 42 vpm (vehicles per minute) arrival rate while discharging @ 18 vpm; thereby causing the entire peak hour traffic to queue. Therefore, the proposed SPI design with single on-ramp will not provide the required storage capacity needed for safe and effective operation of ramp meters.

3. An interchange is expected to operate at an acceptable level of service based on forecasted traffic volumes for 20 years after construction. The traffic and circulation numbers from the AIP alternative show how the traffic level of service performs with partial cloverleaf interchanges. There is no technical analysis in the SMI Report that shows SPI level of service and operational performance. Partial cloverleaf interchanges provide better capacity over other interchange types due to the advantage of having two on ramps (loop and direct onramps), which offer more capacity and better traffic management. With partial cloverleaf interchanges, left-turn movements from crossroads are eliminated thereby permitting two phase operation at signalized ramp intersections versus the three phase SPI cycle.

4. The 2001 Department Single Point Interchange Planning, Design, and Operations Guidelines (Guidelines) provide guidance to exercise sound judgment in the selection of interchanges. Interchange choices should never be prejudiced, and if SPIs are applicable in candidate locations, the Department's SPI Design Guidelines should be followed to bring *concept proposals* forward for *conceptual approval*. Design issues should be resolved as early in the environmental phase as possible, and not in later stages of engineering.

   Unlike other interchange types, the Department's SPI guidelines require SPI concept approval from our Headquarters Chief of Design and Traffic Operations Divisions for the limited use of SPI's due to the specific risks and concerns with performance, safety, operations, and capacity.

   The following bullet points represent Department concerns (identified from SPI Guidelines) for the placement of SPI's on I-5 that must be reviewed and vetted prior to potential inclusion as a viable alternative.

   a. <u>Capacity:</u> In urban settings, the local road system is often the controlling factor for overall system capacity. When adequate storage length cannot be provided the capacity advantages of the SPI diminish due to the close proximity of adjacent local intersections. Intersection spacing becomes even more critical because all stopped traffic must be stored between the near stop bar and the adjacent intersection. Short spacing from the ramp intersection to the adjacent local streets and driveways will limit the ability for the local street system to handle the large volumes of through traffic that the SPI can deliver. The purported advantages of the SPI will often not materialize where the local street system is not compatible. These are concerns for I-5 at El Toro, Ortega, and Crown Valley Pkwy.

b. Traffic Operations: The size of SPI intersections necessitates a long traffic signal clearance interval for all moves. The all-red clearance interval represents dead time to the signal timing cycle, which reduces capacity and efficiency. Under moderate to heavy traffic demands, SPIs require longer signal cycle lengths to maximize operations. SPIs may not operate efficiently when the traffic volumes along legs of the intersection are unbalanced. This condition exists at Crown Valley, Ortega, and other interchanges along the corridor. Bicycles and pedestrians adversely affect the capacity and operation of motor vehicles at SPI intersections, thereby negating the benefits of an SPI over another interchange alternative with high volumes of pedestrians and bicyclists. Because traffic signals at SPI intersections are timed to move motorists efficiently through the intersection, pedestrians normally can only cross a portion of the intersection in a single cycle. Therefore, it may take a pedestrian as many as four cycles to cross the separate ramps. These are concerns for I-5 at Pico and El Toro.

c. Geometrics (vertical and horizontal alignment): SPIs are best suited for under crossings since it is difficult to provide good geometrics at over crossings. Off ramps on ascending grades are particularly prone to directing headlights into opposing exit ramp driver's eyes. SPI guidelines state that when the local street alignment is curved, it may be difficult for the driver to determine the proper lane as they approach the SPI intersection. Corner sight distance is a problem at off ramps when the cross street is skewed as it is important to provide visibility between off ramp traffic and cross traffic approaching from the left. These are concerns for I-5 at El Toro, Pico, Ortega, and Crown Valley.

d. Construction: Stage construction will be very costly and challenging. In every instance, the profile of the mainline I-5 would be reconstructed to achieve safe sight distance for the mainline and ramps. The I-5 structures will also require reconstruction. Temporary structures would be required to stage the reconstruction significantly adding to the cost of the project and traffic impact to the motorists. Managing the traffic for the high traffic volume on I-5 freeway and local streets during construction period would be a major undertaking and a huge impact to motorists. In addition, any future expansion of an SPI would be extremely difficult and costly.

e. Utility and other easement issues: Utility relocations and utility or other easement issues that may impact right of way have not been identified.

5. The SMI Report (page 11) reports the incorrect number of existing and future I-5 improvements for the AIP alternative and as such provides fewer lanes in the SMI Report than the AIP alternative. The SMI Report also proposes fewer lanes on several Secondary Master Planned Arterial Highways adjacent to I-5. One arterial is El Camino Real, which is the only local arterial through San Clemente. These impacts negatively affect the SMI Report alternative level of service and require evaluation.

6. The SMI Report proposes elimination of northbound off ramps and on ramps at I-5/El Camino. The elimination of these ramps is in conflict with Federal Highway guidelines, which require full service interchanges for return movements if drivers mistakenly exit the freeway. The SMI Report needs to address the impact to local traffic circulation.

7. All extended detention basins (EDB) must meet Department approved Statewide Management Plan (SWMP) guidelines, which provide for EDBs to be constructible, maintainable and effective in removing pollutants using appropriate location and design criteria. SMI has proposed placement of EDBs in steep slopes above the freeway and ramps, or underground in adjacent privately owned parking areas. SMI's placements of EDBs do not meet SWMP guidelines.

8. The SMI Report notes "*...only properties in which building structures would have to be removed are considered displacements*" and despite not being listed "*acquisition of additional small portions of properties may be required.*" Displacements relating to buildings and structures should be clarified more accurately as full-take and part-take acquisitions.

9. The interchange detail drawings lack accurate standard horizontal and vertical geometric details necessary to make right-of-way impact assessments.

10. The SMI Report 2005 data for business and residence acquisition costs are unrealistic given the dynamic real estate values in the area.

11. Page vi, first paragraph states that "Nearly all of the widening of the I-5 can be completed within the existing I-5 right of way". Contrary to this statement, we could not identify any excess R/W to be used for the proposed widening at the following locations: El Toro Road to Alicia Parkway; PCH to San Juan Creek Road; SB I-5, north of Avery Pkwy; SR-73 to Junipero Serra.

12. It appears that where right of way was not available, ramp closures (NB I-5 El Camino Real off and on ramps), lane reductions (on secondary arterials), and reduced lane and

shoulder widths were proposed without evaluating the impact. This ignores the Department's mandatory design standards.

13. The SMI Report did not factor in the cost of retaining walls along the I-5 and for the reconstruction of the entire I-5/SR-73 interchange needed for this widening.

14. Page 7, 2nd paragraph states, "This listing of these improvements in the LRTP provides a much clearer path for funding of these improvements than is suggested in the SEIR". The Orange County Long-Range Transportation Plan (LRTP) includes the toll road, funded through the Toll Road program and bonded against future tolls, as a baseline. Therefore, the funding for these additional capacity improvements has not been identified.

15. Page 7; last paragraph states that "*The major design components of the AIP Alternative, such as lane width, conform to the AASHTO standards*". As noted in Section 82.3 of the Highway Design Manual (HDM), "AASHTO policies and standards, which are established as nationwide standards, do not always satisfy California conditions. When standards differ, the instructions in the HDM govern, except when necessary for FHWA approval."

16. Page 18 shows the proposed SPI for Ortega Highway. Redesign and reconstruction of this interchange is currently under consideration by the Department.

17. The SMI Report proposes to replace several interchanges along the I-5 with SPIs without considering geometric constraints, operational and safety impacts (i.e. close proximity of local intersections and pedestrian safety).

18. SPI design is usually considered as an alternative for tight diamond interchange.

19. SMI asserts that "*traffic performance of the carpool lane/surface street improvement alternative*" SMI proposes "*has been validated by TCA's own consultants.*" and that "*AIP-R alternative outperforms the toll road in relieving congestion.*" The SMI Report makes this claim by stating that the AIP and SMI Report alternatives are "*functionally*" identical with the exception of the interchanges and assumes the benefits from the AIP alternative provided from prior TCA traffic studies without additional study. The SMI Report does not provide supporting analysis that demonstrates how the alternatives are functionally identical.

20. The Department's June 21, 2006 letter to Federal Highway Administration (attached) affirms TCA's "adequate and defensible" modeling methodologies and TCA's appropriate application of minimum Department Design Standards when comparing alternatives.

21. The Department will not provide comments on the arterial component of the SMI Report alternative, as this is a local agency issue.

22. The SMI Report includes excerpts from the 2006 Orange County Long-Range Transportation Plan (LRTP) that describe "*improvements proposed for the I-5 corridor, many of which were also included in the AIP alternative.*" The SMI Report's excerpts are not comprehensive references to the LRTP to provide full information. The SMI Report fails to fully acknowledge that the completion of the southern portion of the Foothill Transportation Corridor and widening of the toll road system to its planned ultimate width (Eastern/Foothill Transportation Corridor Agency Project) plays a significant role in the LRTP baseline. As such, the right of way impacts related to the LRTP Interstate 5 improvements would be less than the AIP alternative because they do not provide the same capacity benefits. The Department is working with the South Orange County Major Investment Study team that is evaluating the current and future needs of traffic demands in south Orange County. Initial traffic studies show that a significant multi-modal capacity increase is required on I-5 in addition to the benefits provided from the toll road.